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AUGUST 29, 1955

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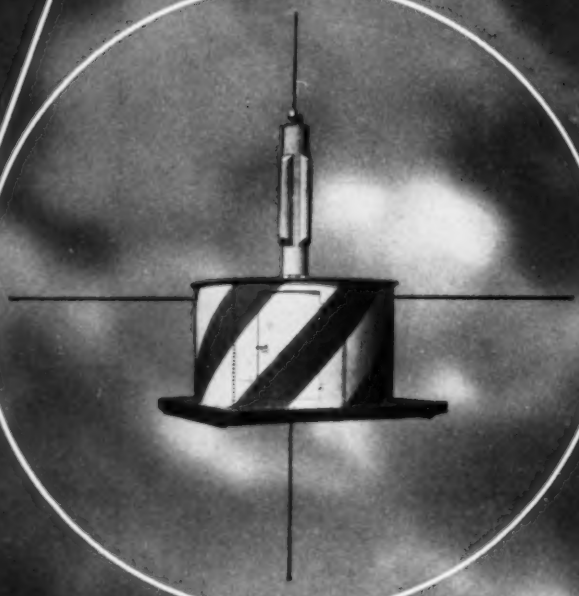

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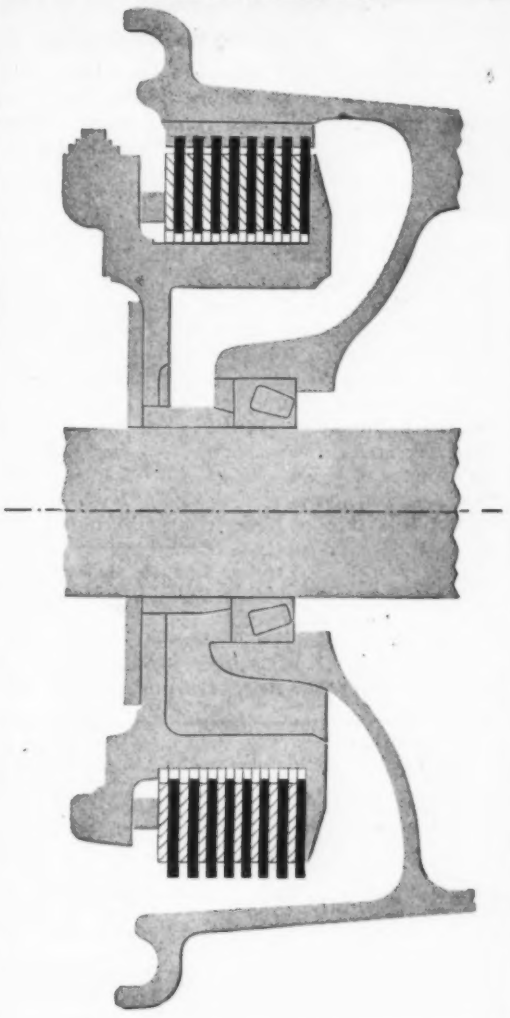

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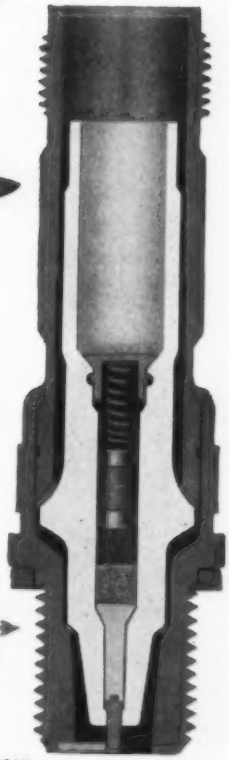

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Industry News Digest

Senate Report Raps AF on Titanium

Air Force "vacillation" in encouraging use of titanium in military aircraft was sharply criticized in a Senate Interior Committee staff report which strongly urged increased use of the light-weight metal "if America is to maintain its air supremacy."

The report—released with the strong endorsement of Chairman James E. Murray (D-Mont.)—grew out of a series of conferences held with titanium sponge producers, fabricators, aircraft manufacturers and Government officials. Prepared largely under the direction of the late Maj. Gen. Kern D. Metzger, USAF (Ret.), whom Sen. Murray described as "the outstanding authority in the field," the report may serve as the basis for further public hearings.

• **Murray asserted** that unless titanium is used to a greater extent "our plane designers can simply cease striving for the high performance—accelerated rate of climb, temperature resistance in supersonic flight, and fuel demands in such operational zones—that is essential to the national security."

The report charged that the nation's "titanium program has been retarded partly by the unnecessarily pessimistic attitude taken by certain Government officials." It cited "an obvious lack of coordination and direction among the executive agencies and committees dealing with the titanium program."

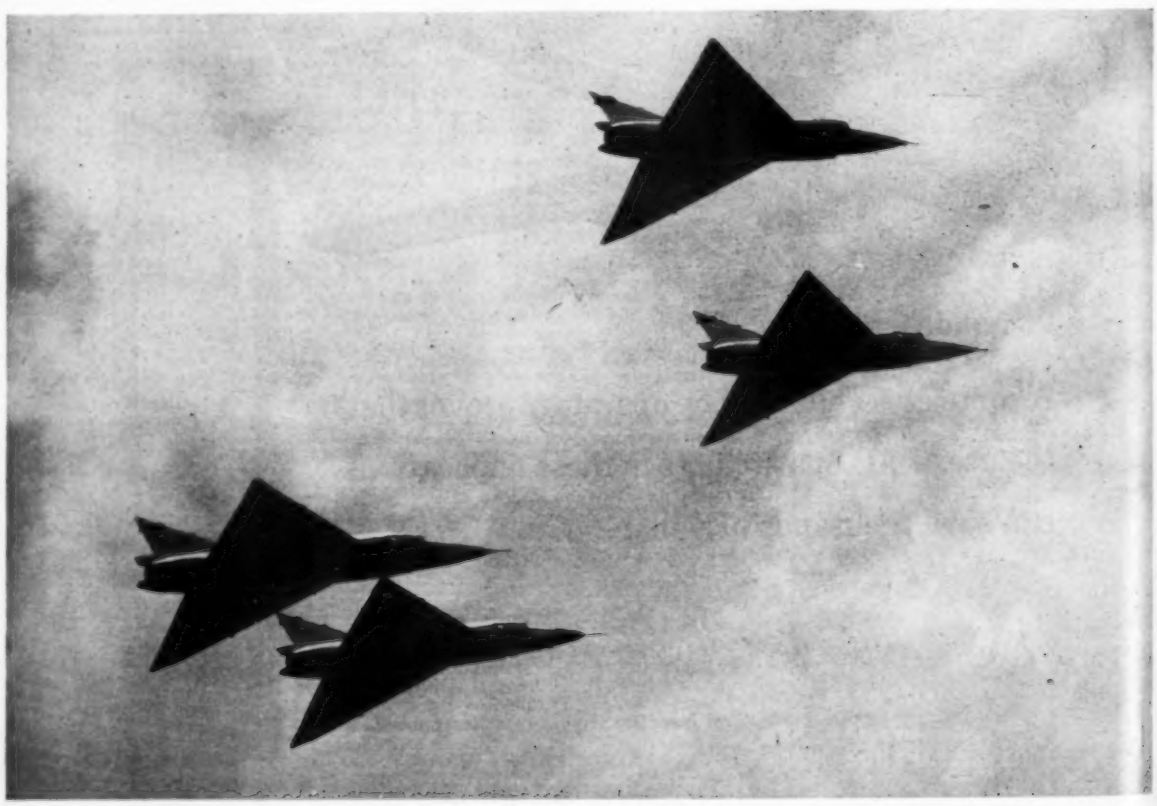
" . . . there is such a maze of red tape, routine and timidity," the report noted, "that an idea often becomes obsolete before it can be put into practice." It blamed the Defense Department for not taking "a strong enough lead" in making titanium a success, and questioned whether the AF is following "in practice" its avowed policy to encourage use of the metal.

• **Despite delays,** the Metzger staff reported, "there is complete justification for great optimism about the future of titanium as the evidence shows that its technology is advancing by leaps and bounds and the most knotty problems are being solved almost daily."

The report referred to varying degrees of enthusiasm among aircraft manufacturers for titanium, observing that enthusiasm "is in direct proportion to the experience in its use." It reserved criticism, however, on the grounds that industry had not fully discharged its responsibility for "forcefully presenting its needs for better materials to build better aircraft to the procuring services, to industry, and to the public at large."

The staff noted Gen. Metzger's belief that the Aircraft Industries Association "should formulate an energetic program to make known the aircraft industry needs, materialwise and otherwise, for the manufacture of improved military aircraft." It said it was "shocked" to learn that AIA "had not even taken a look at the titanium situation for 6 or 8 months" as of the middle of May.

• **More Government** aid is indicated, the staff reported, not only in the development of primary production processes, but in direct assistance to fabricators in evolving new methods, "even to the extent of financing special equip-



FIRST FORMATION FLIGHT OF CONVAIR F-102A supersonic interceptors was made recently over Southern California. Here four of the all-weather Air Force planes display their striking delta-wing configurations. F-102A, which is 68 feet long and has a wing span of 38 feet, is powered by a Pratt & Whitney Aircraft J57 with afterburner.

ment such as extrusion machinery, heavy presses and rolling mill equipment designed particularly for the handling of titanium."

Eight aircraft manufacturers were interviewed by the staff: Convair Div. of General Dynamics (Ft. Worth Div.); Curtiss-Wright; aircraft gas turbine div. of General Electric; Allison Div. of General Motors, Grumman, North American Aviation, Pratt & Whitney and Republic. Six of these, it reported, "were convinced that the expanded use of titanium is a 'must.'" One company was "less enthusiastic," though granting titanium had to be used, while the eighth was "ultraconservative"—acting "only under contract specifications set by one of the armed services."

Among its observations and conclusions, the staff said:

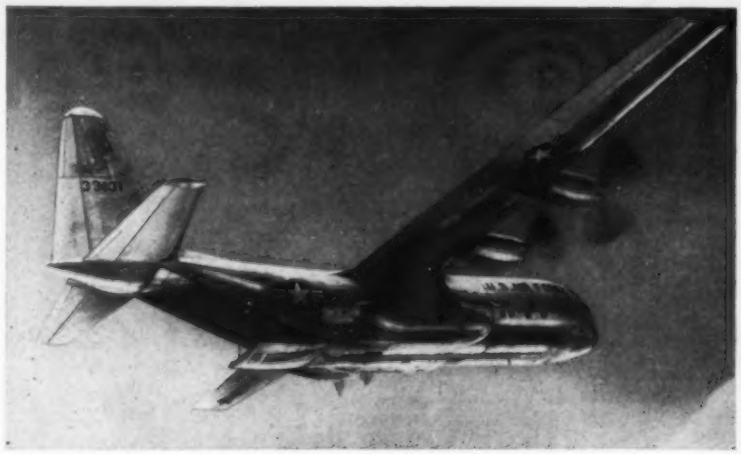
- Consider the price of titanium tetrachloride as the key to the "cost bottleneck" of most processes.
- Demand for titanium will in the near future exceed all present expectations.
- Specialized, completely integrated titanium facilities are required to improve quality and reduce cost.
- Rejection rate of titanium parts has dropped notably, particularly in manufacture of titanium turbine blades.
- An early review of ODM's 22,500-ton sponge freeze order is necessary, due to 2- to 3-year period required to put new facilities in full-scale production.
- Government activity in titanium program should be centralized and coordinated, to end confusion which communicates itself to industry.
- Detailed titanium requirements, and adequate data for formulating future requirements, must be established.
- Inter-company cooperation in sharing technical know-how, even at the shop level, should be increased.
- Intensive cost studies are needed, including attention to problems of scrap recovery, chemical machining, powder metallurgy, extrusions, integrated special facilities and more industry education toward civilian use.

ATA Cost Formula Now Includes Jets

Revised edition of Air Transport Association's "Standard Method of Estimating Direct Operating Costs of Transport Airplanes," amended to include data on future turboprop and turbojet aircraft, has been published by ATA.

Widely known as the "ATA Formula," the document is designed to help airlines, airframe and engine manufacturers in determining economics of an airplane for operation on a given route, and to compare different airplane models under a standard set of conditions.

Copies of the revised edition are available by writing ATA's engineering division director Allen W. Dallas.



LOCKHEED C-130 TURBOPROP combat cargo transport opens its huge rear cargo-drop doors during a recent maneuver. C-130, powered by four Allison T56 turboprop engines, is designed for aerial drops of vehicles, guns, missiles and bulk supplies. Quantity production for Air Force is under way at Lockheed's Mariette, Ga., plant.

UAL To Expand Base Maintenance Facility

United Air Lines has announced a $6-million expansion of its San Francisco maintenance base facilities bringing its total investment at that location to about $16 million.

Construction is slated to get under way next spring with completion set for early 1958. Included in the plan are new hangars, line maintenance facilities, overhaul shops, ramp and warehouse areas.

Ryan Jet VTO Plane At Edwards for Test

Ryan Aeronautical's jet vertical takeoff plane is at Edwards AFB, Calif., preparatory to first flight. The VTO, with a Rolls-Royce Avon powerplant, was shrouded in canvas when trucked to Edwards from San Diego, but observers said it appeared to have a delta wing configuration and is quite small.

Ryan developed the VTO under a $7-million Air Force contract.

Private Flyers to See Tacan Next Month

Federal Telecommunications Laboratories says it will definitely demonstrate private-flyer Tacan equipment early in September. Meanwhile, Stromberg-Carlson division General Dynamics Corp., which have been building Navy Tacan equipment, are pushing development of civil TACAN.

Ryan Receives New Missile Contract

Ryan Aeronautical Co. has received a $2.5-million Air Force contract for advanced development of electronic guidance systems for supersonic missiles. Ryan says the contract covers a new phase of the company's previous work in missile guidance and calls for development of electronic "intelligence" for important new weapons.

BEA Reports Profit

British European Airways reports a net profit of $176,550 for its fiscal year ended March 31, compared with a deficit of nearly $4-million a year ago. Ton-mile costs were down 12.2% and the break-even load factor dropped from 71.8% to 64.5%.

Piper Workers Strike

The month-old strike at Piper Aircraft Co. had not been settled late last week, although officials expressed hopes for an early end to the walkout. The plant was shutdown August 1 in the first major strike since 1940. Negotiations with International Association of Machinists were stalemated over problems of job evaluation and fringe benefits.

Tetrode Transistor

A long stride toward expanded applications for transistors has been taken by Bell Telephone Laboratories through development of a tetrode transistor capable of 1,000 mc operation. Production is expected this year.

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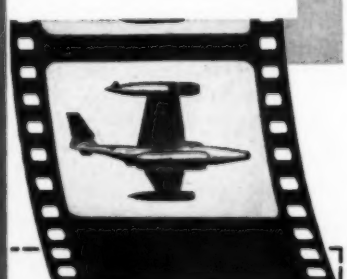

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Letters

More on Washrooms—

To the Editor:

In a recent issue of AMERICAN AVIATION your column made mention of messy wash rooms on the airlines.

I would like to say that a copy should be presented to every airline passenger in the country.

However, you did not go far enough in your tirade. As a crew member, I would like to go to some of the passengers homes and act the way they do aboard an airplane.

After thoroughly messing up his bathroom, I would sit in his living room, smoke innumerable cigarettes and ignore the ash trays. I would scatter ashes all over the carpet and grind the butts out on either the carpet or sofa. If any refreshments were served I would be as messy as possible and leave crusts of bread, cake, or what have you, on the floor, in sofa cushions, or any other such handy receptacles. This conduct would no doubt make me ill, so rather than use the containers provided, I would either throw up on the empty seat next to me, or dash for the bathroom and do it on the floor just outside.

The amazing part of this whole thing is, that as a rule, the more deluxe and high class the flight is supposed to be, the messier the airplane is.

People, God bless their ticket-purchasing souls, are the messiest animals alive.

You have my permission to use this letter, but if you do, please omit my name. I like my job and hope to fly cluttered-up airplanes for many more years.

Keep up the good work. I enjoy the magazine and wish you luck in your crusade for better hotel facilities.

And although I own neither a Bentley nor a Cadillac I'll take the Bentley any time.

(Name omitted by request.)

Books

The Automatic Factory—A Critical Examination. *By Stephen A. June, John D. Bardis, Lee H. Lurio, Leonard S. Polaner, Oystein Sagedahl, Herbert A. Skenar, Bernard K. Yenkin. Published by Instruments Publishing Co. (Richard Rimbach, publisher), Pittsburgh, Penna. 88 pages. Price: $1.50.*

A joint report by seven authors, working toward masters' degrees in business administration on industrial development of the automatic factory as it stands today.

The work is designed to bridge the gap between theoretical concepts and actual developments. It is written for the businessman, to clarify the extent of automatization encountered in the author's travels over a period of six months. Case histories and company names are given.

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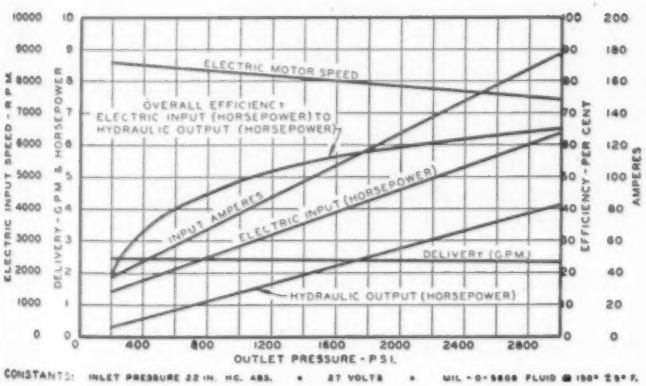
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AMERICAN AIRLINES

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Personal View

By WAYNE W. PARRISH

DUPLICATION AND DIVERSION

BACK IN JULY before the former Secretary of the Air Force torpedoed himself (a very difficult maneuver which he managed to perform single-handedly with ease and skill) he and Secretary of Defense Wilson were in the limelight over their okay of a strange passenger movement at largely taxpayer's expense.

Yielding to a request by some 20 Congressmen, Talbott, with Wilson's final but apparently grudging approval, ordered three Douglas C-118 transports with 18 crewmen to fly from their New Jersey base to Manila to pick up 192 touring delegates of Moral Re-Armament (only 55 of them Americans) and ferry them slowly around Asia and the Middle East to Geneva, Switzerland on a 57-day 11,000-mile junket for which MRA is paying but a fraction of the total cost.

There was no legitimate excuse for this gratuitous airlift, despite a little Congressional pressure. Quite apart from the precedent it established, the airlift put the stamp of approval of the U. S. on the MRA group and the play they are giving in Asian countries. Maybe it's a good project, maybe not, but the precedent is most unfortunate.

The big issue, however, is the flagrant abuse of military air transport services for non-military purposes. The MRA global ferry is only one of thousands of examples of mis-use of government facilities to the detriment of commercial air carriers and at the taxpayers' expense.

The duplications of military air transport services among themselves is enough of a shocker, but the diversion of commercial-type traffic from commercial air carriers is quite as startling.

This magazine has long championed the development of a strong military air transport service and as many other specialized air transport services as can be reasonably justified. But it is clear today that these numerous services have become a colossal transport giant lacking coordination and certainly lacking in regulations to prevent their abuse.

Last spring the Hoover Commission on Organization of the Executive Branch of the Government issued an exhaustive report on transportation with special emphasis on air transport. Unfortunately this excellent but highly critical report got little public notice in the news of the day. But the Hoover task force did try to penetrate the haze surrounding the extensive military services and to dig sufficiently into their incomplete statistical records to show some of the duplications and diversions.

Largest of the operations, of course, is Military Air Transport Service operating 536 aircraft (425 four-engined) for transport purposes. In fiscal year 1954 MATS carried 1,832,000 passengers domestically and 342,000 internationally. (Total airline passenger traffic over the North Atlantic, both ways, in calendar year 1954 was 550,000.)

After MATS comes FLOGWINGS (The Navy's Fleet Logistics Air Wings) which has developed far beyond its originally-stated purposes, and which carried in fiscal 1954 about 195,000 passengers domestically and 325,000 internationally.

The third largest operation is LOGAIR, launched not long ago by the USAF Air Materiel Command, for cargo purposes only, but which will inevitably carry passengers if it hasn't already started doing so. ("Just to fill up available space, as the saying goes; the airplane's going anyway, why not use the space.")

All other air transport operations by other commands and under administrative assignments, carried an estimated 1,235,000 passengers in fiscal 1954, a very sizeable total.

Added up, this is a lot of passenger traffic. One will not quarrel with the fact that a large amount of this traffic is legitimately military, i. e., it comes within the original concept of military air transport operations. But included is a pretty heavy percentage of commercial-type traffic which represents outright diversion from commercial carriers. Added to this is the fact that the Navy's FLOGWINGS duplicates mile by mile and route by route a great deal of MATS' operations, especially internationally.

One can skip over such single blunders as MATS flying 25,000 pounds of cement to Bermuda in July, 1954, but it is difficult to skip over the diversion by MATS of a considerable amount of passenger traffic such as foreign government officials, officials of international commissions and agencies, the MRA group, and the men in uniform who are given six cents a mile on leaving one base to travel to another and then hop rides free on military aircraft, thus pocketing the money that was to go to public carriers. We know of instances where foreign officials were all ticketed on commercial air carriers, only to have MATS snatch them away for free carriage and the airlines left with empty seats and an obligation to refund the ticket money.

The Hoover Report stated that if U. S. international airlines were able to obtain only 25% of the passenger volume and 50% of the military mail shown to have moved on MATS for fiscal 1954, the carriers would have reduced their subsidy bill for that year by $42.9 million, *almost 88% of the total amount.* This was startling, and had immediate results. Military mail, or at least most of it, has been transferred to commercial carriers with a resultant sharp decrease in subsidy; in fact several carriers have no subsidy remaining at all. But the passenger problem and the duplicating of military operations remains to be tackled and only a firm directive from the Secretary of Defense can bring order out of costly chaos.

WE CAN HEAR 'EM NOW

The coming jet age is going to create a lot of problems. For example, consider the passenger who gets up at his hotel in London and has breakfast. He goes to the airport and after checking in he has a roll and coffee to pass the time away. He boards his plane and is served another breakfast, this time a deluxe one. He arrives in New York only to find that it's still breakfast time. Can't you already hear the gripes from passengers about too many breakfasts? And bless their complaining hearts, won't all of them put the blame on the airlines?

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Production Spotlight

• First McDonnell Aircraft F-101B all-weather interceptor for the Air Defense Command probably will not fly for another 12 to 15 months, despite what apparently was a hurriedly prepared Defense release saying emphasis was being switched from the F-101A escort version to the B configuration, according to a Pentagon source.

• Boeing XB-47D test bed for Curtiss-Wright's 10,000 eshp-plus T49 turboprop engines has not yet flown, although originally scheduled early this year. Program is months behind due to both engine and propeller difficulties.

• Douglas Aircraft Co. does not contemplate using the C-133 pressurization test water tank it is building at Long Beach in its DC-8 testing program. The 170-foot tank, to be used in a program similar to British tests on the Comet, is scheduled for completion in about a month.

• Boeing rollout of B-52 bombers now numbers in the dozens and one recent Seattle formation flight, largest yet seen, numbered seven planes. Air Force now plans a daily fly-by of four or five of the eight-jet bombers and much larger numbers of Boeing B-47s at the National Aircraft Show in Philadelphia Sept. 3-5. Other new planes to be shown probably will include the Lockheed C-130 turboprop transport and the McDonnell F-101A escort fighter.

• McDonnell F3H-2N, with a new wing and the Allison J71 replacing the Westinghouse J40 (which powered the 1N versions), is expected to show considerably improved performance in climb, level flight and landing characteristics over earlier Demon, Navy sources say.

• Most discussed topic at recent Institute of the Aeronautical Sciences Seattle turbine meeting was the "slow roll" demonstration of the Boeing 707 jet transport by test pilot "Tex" Johnson for 500,000 spectators attending the Gold Cup speed boat races. It came as quite a surprise to most top Boeing officials, too, as Johnson first rolled the 707 only a short time earlier that same day in practice for the fly-by.

• India's government-owned Hindustan Aircraft is working on a basic jet trainer and an advanced jet trainer. Company also is considering development of a medium-range transport.

• Glenn L. Martin Co. has turned over launching of its TM-61 Matador J33-powered missile to the 6555th Guided Missile Squadron at Patrick AFB, Fla., following nine years of research and development on the pilotless bomber.

• Two new Italian trainers are in the works: the Macchi MB.326, a tandem two-seater with an Armstrong-Siddeley Viper (later to be replaced by the trainer version of the Bristol Orpheus), and the Ambrosini P.18, a side-by-side two-seater using engines in the 880-1,800-lbs.-thrust class and capable of taking off with a run of 600 feet.

STABLE MABEL, Kellett Aircraft's rocket-powered single-place helicopter, is undergoing continued flight tests for Office of Naval Research's Air Branch. The KH-15 is powered by Reaction Motors hydrogen peroxide rocket engines mounted on each blade tip. Spherical fuel tanks are mounted on each side of pilot. Pilot controls the copter by movement of his body. First flight was made early last year.

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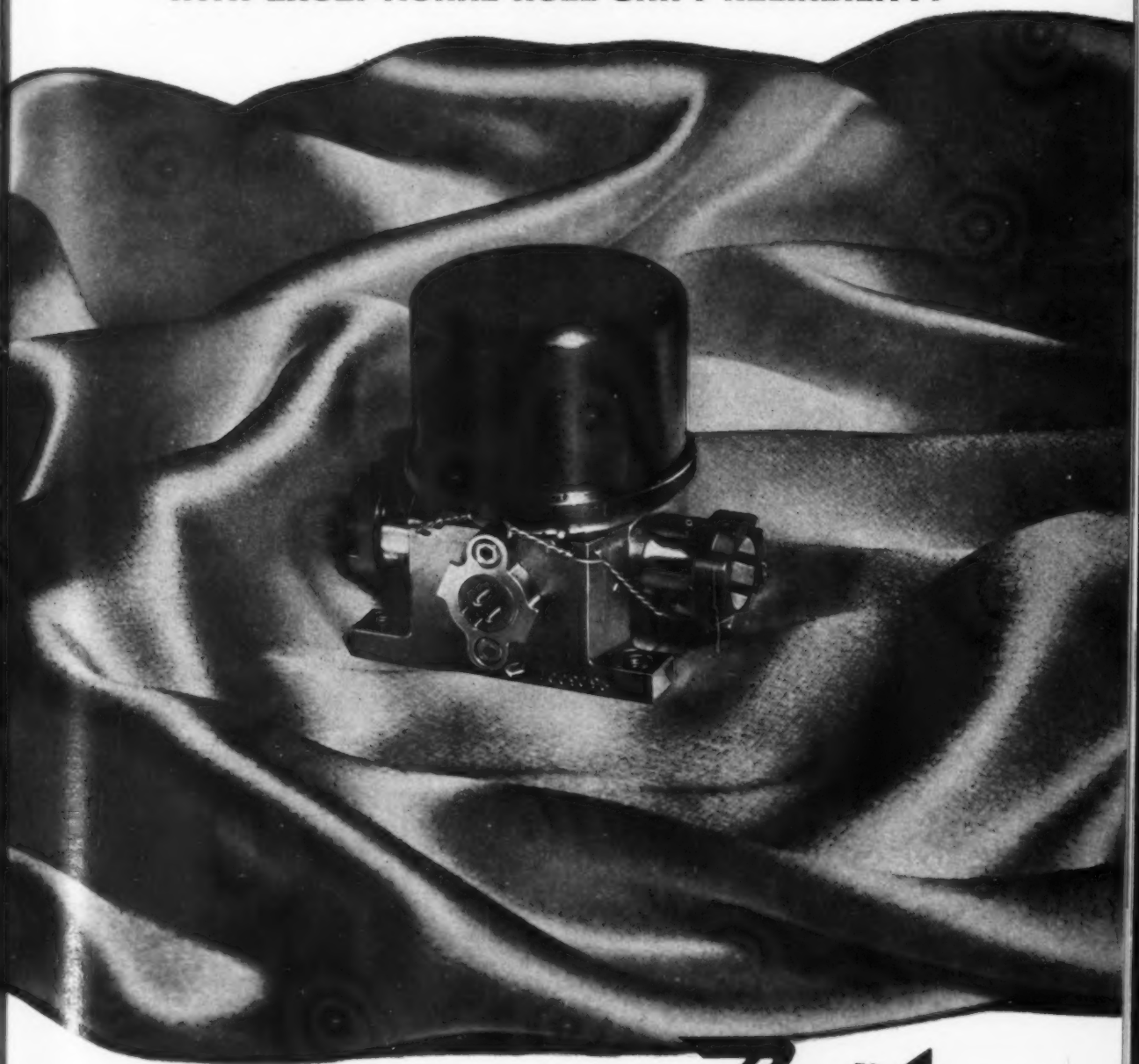

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When & Where

Aug. 31—Air Transport Association air freight sales & promotion committee meeting, Washington, D. C.
Sept. 3-5—National Aircraft Show, sponsored by Air Foundation, Philadelphia International Airport.
Sept. 8—Airwork engine forum, sponsored by Pratt & Whitney and Bendix, Millville, N. J.
Sept. 16—Airwork engine forum, sponsored by Pratt & Whitney and Bendix, Miami, Fla.
Sept. 19-21—American Rocket Society fall meeting, Los Angeles.
Sept. 21—Southwest Airmotive engine forum, sponsored by Pratt & Whitney and Bendix, Dallas, Tex.
Sept. 21-22—American Helicopter Society second annual western forum, Los Angeles.
Sept. 25-27—International Northwest Aviation Council's 19th annual conference, Yakima, Wash.
Sept. 26-27—Automation Symposium, sponsored by R.E.T.M.A., Univ. of Pennsylvania, Philadelphia.
Sept. 26-Oct. 8—USAF second annual all-jet Fighter Weapons & Gunnery Meet, Yuma AFB, Ariz. and Nellis AFB, Nev.
Sept. 27—N. Y. State annual airport development & operations conference, Syracuse.
Sept. 28-29—Industrial electronic conference, sponsored by AIEE and IRE, Detroit.
Sept. 28-29—Industrial Electronics Conference, sponsored by A.I.E.E. and I.R.E., Park Sheraton Hotel, Detroit, Mich.
Sept. 29-30—Radio Technical Commission for Aeronautics, Fall Assembly, Hotel Statler, Washington, D. C.
Oct. 1—Symposium on small gas turbines, sponsored by American Society of Mechanical Engineers and Brooklyn Polytechnic Institute, New York City.
Oct. 3-5—Eleventh annual National Electronics Conference, Hotel Sherman, Chicago, Ill.
Oct. 4-6—11th Annual Spark Plug & Ignition Conference, sponsored by Champion Spark Plug Co., Toledo.
Oct. 5-7—National Airports Conference (sponsored by American Association of Airport Executives and the University of Oklahoma, Norman, Okla.
Oct. 5-7—National Business Aircraft Association annual meeting & forum, Detroit.
Oct. 7—Symposium of "Escape from High Performance Aircraft" under auspices of Aero-Medical Engineers Association, Los Angeles.
Oct. 8-14—Ninth annual All-Texas Air Tour.
Oct. 11-13—Air Transport Association engineering & maintenance conference, Dallas, Tex.
Oct. 11-15—National Association of State Aviation Officials annual meeting, Dallas, Tex.
Oct. 11-15—Society of Automotive Engineers aeronautic meeting, aircraft engineering forum & aircraft production forum, Los Angeles.
Oct. 31-Nov. 1—East Coast Conference on Aeronautical and Navigational Electronics, sponsored by I.R.E., Baltimore, Md.
Nov. 7-9—Eastern Joint Computer Conference (IRE-AIEE-ACM), Hotel Statler, Boston.
Nov. 28-30—Instrumentation Conference and Exhibit, sponsored by I.R.E., Atlanta Biltmore Hotel, Atlanta, Georgia.

INTERNATIONAL

Aug. 30—International Civil Aviation Organization air navigation conference, Montreal.
Sept. 6—International Civil Aviation Organization conference on draft protocol to amend Warsaw convention, The Hague.
Sept. 6-11—Society of British Aircraft Constructors Aircraft Show & Flying Display, Farnborough, England.
Sept. 7—International Federation of Independent Air Transport management committee meeting, London.
Sept. 19—IATA traffic advisory committee meeting, Miami, Fla.
Sept. 20—IATA annual traffic conference, Miami, Fla.
Oct. 10—IATA legal committee meeting, Nassau.
Oct. 11-12—Franco-Italian aeronautical meeting, Paris.
Oct. 13—IATA executive committee meeting, New York City.

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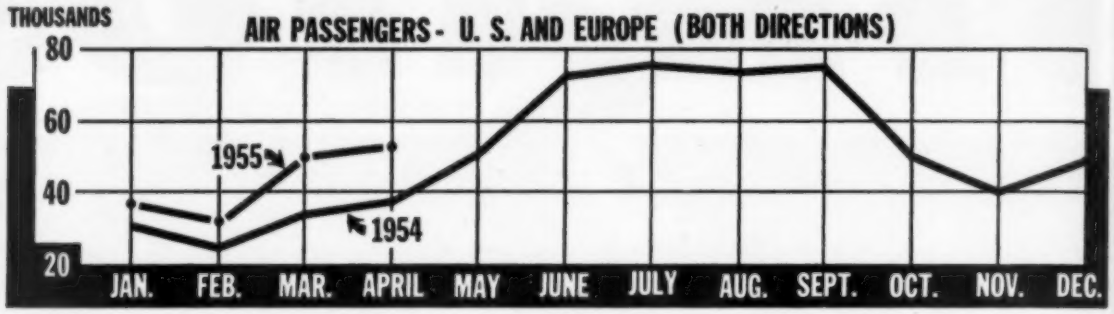

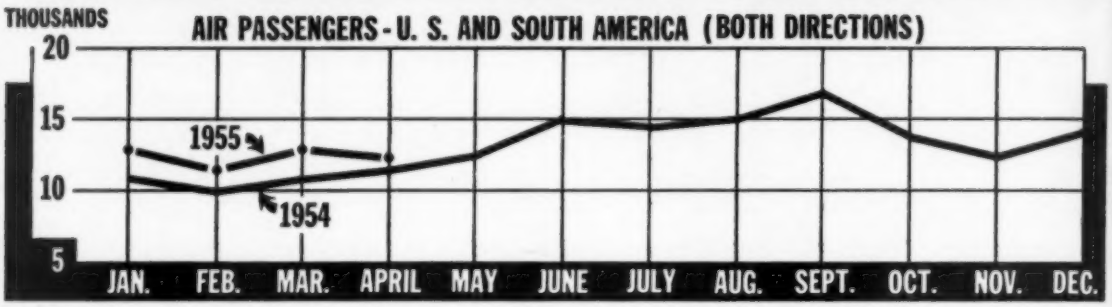

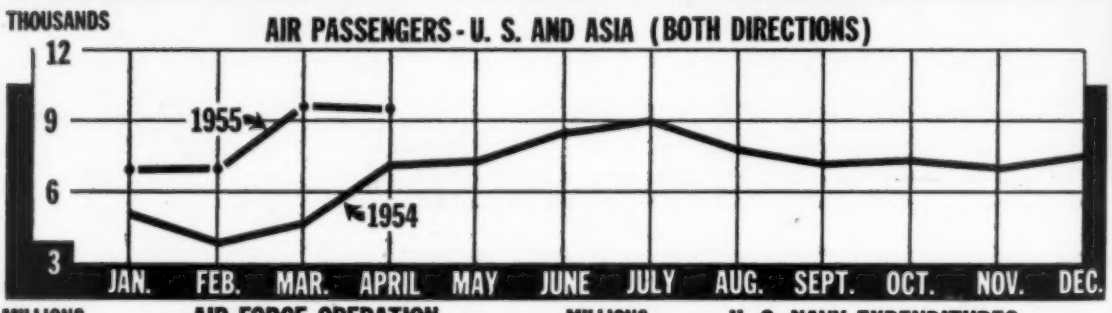

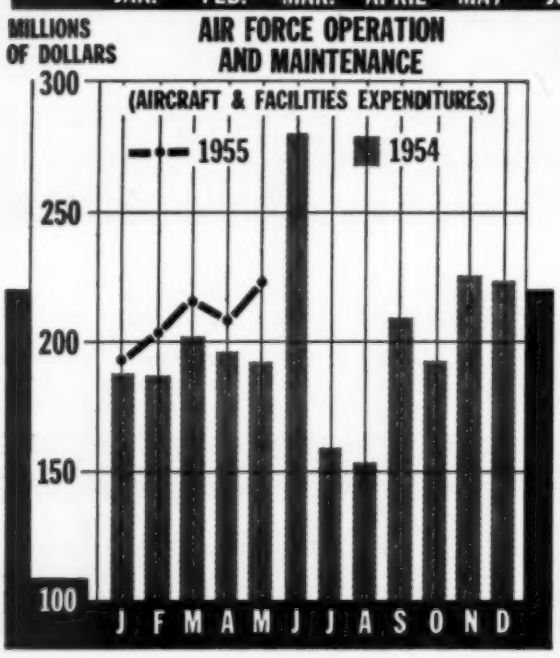

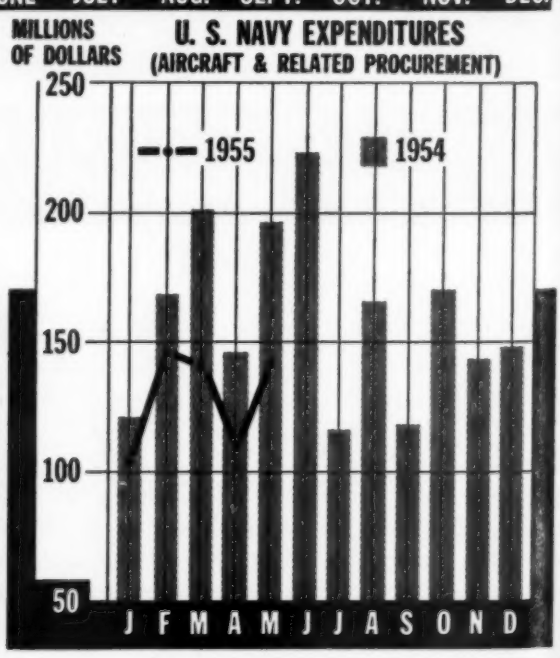

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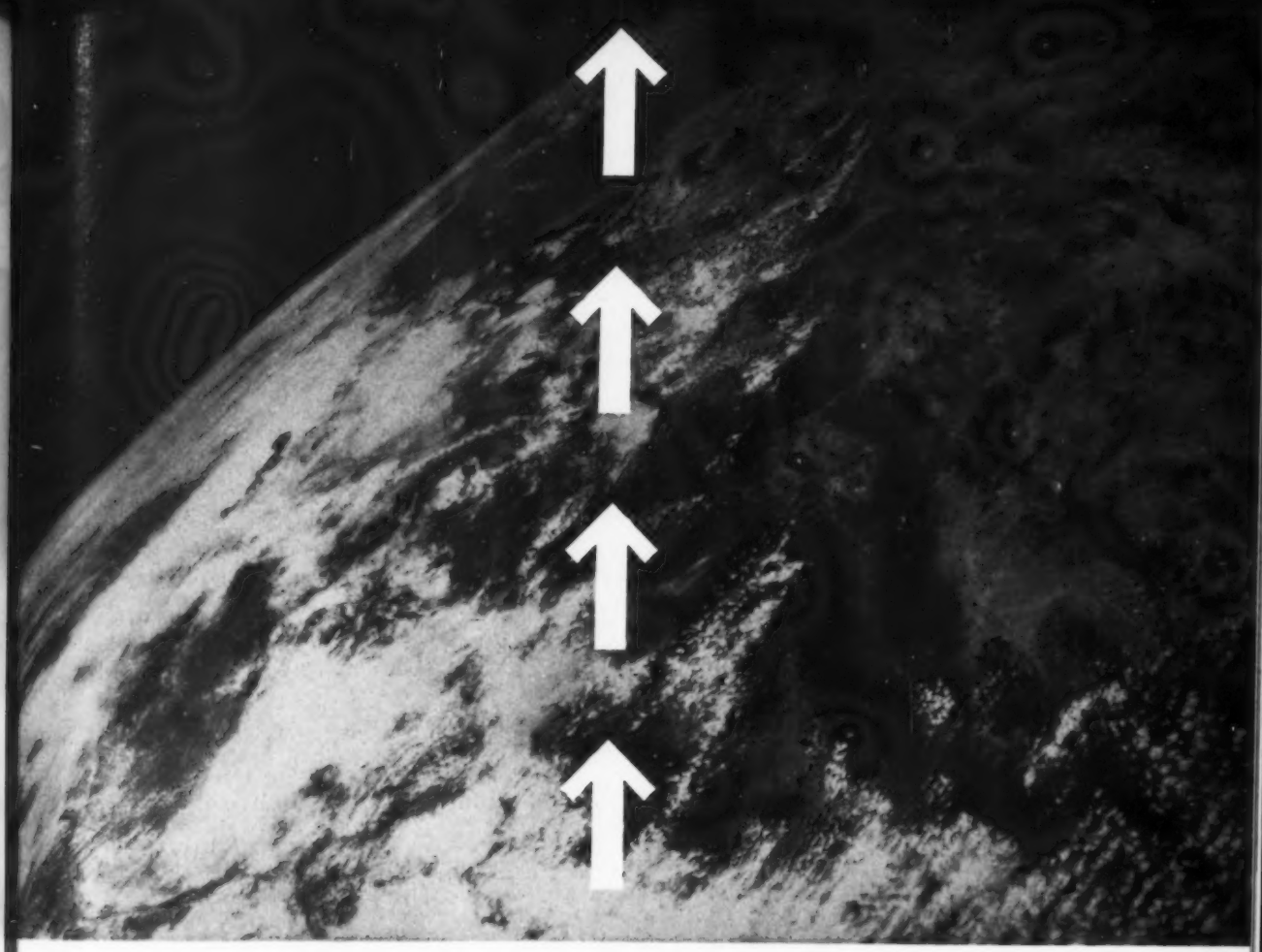

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To the young engineer and to the enlistee for military service, this picture says more than words about the immense opportunities to be explored – in uniform or out – in the closely integrated field of military and commercial aviation.

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RELUCTANCE TO DEPART FROM MANNED AIRCRAFT concepts in development and planning of missiles may prevent maximum progress in their integration into the Air Force, AF Chief of Staff Nathan F. Twining warns in new USAF Guided Missile Policy AFR 58-1. Twining feels missiles are "weapons with special qualities" and that plans for their use must be designed to exploit these features.

New Air Force policy measures to speed missile use are threefold: first a limited number of missile organizations will be formed, equipped and tested by combat commands to gain operational data—this will start during missile R&D program even though some uncertainties exist.

Policy next calls for a plan to integrate added missile units into combat inventory long before operational data are complete, the extent of planning to be based on R&D program results and early operational data. Once enough operational experience is gained, a comparative evaluation of missiles and manned aircraft as to combat effectiveness will be made, to determine the extent to which missiles can profitably be integrated into the Air Force.

NEWLY FORMED PIASECKI AIRCRAFT CORP. is wasting no time in its move into the vertical lift aircraft picture. President Frank Piasecki reports an increasing backlog of both defense and commercial projects along with an R & D staff expansion. Plant site will definitely be in the Delaware Valley.

Among newest PAC staff members are three former Piasecki Helicopter Corp. engineers: Z. M. Ciolkosz, former development design engineer, as chief of design and analysis; F. E. Mamrol, PHC senior group engineer, as chief design engineer, and, H. G. Somerson, former chief of dynamics, as chief analytical engineer.

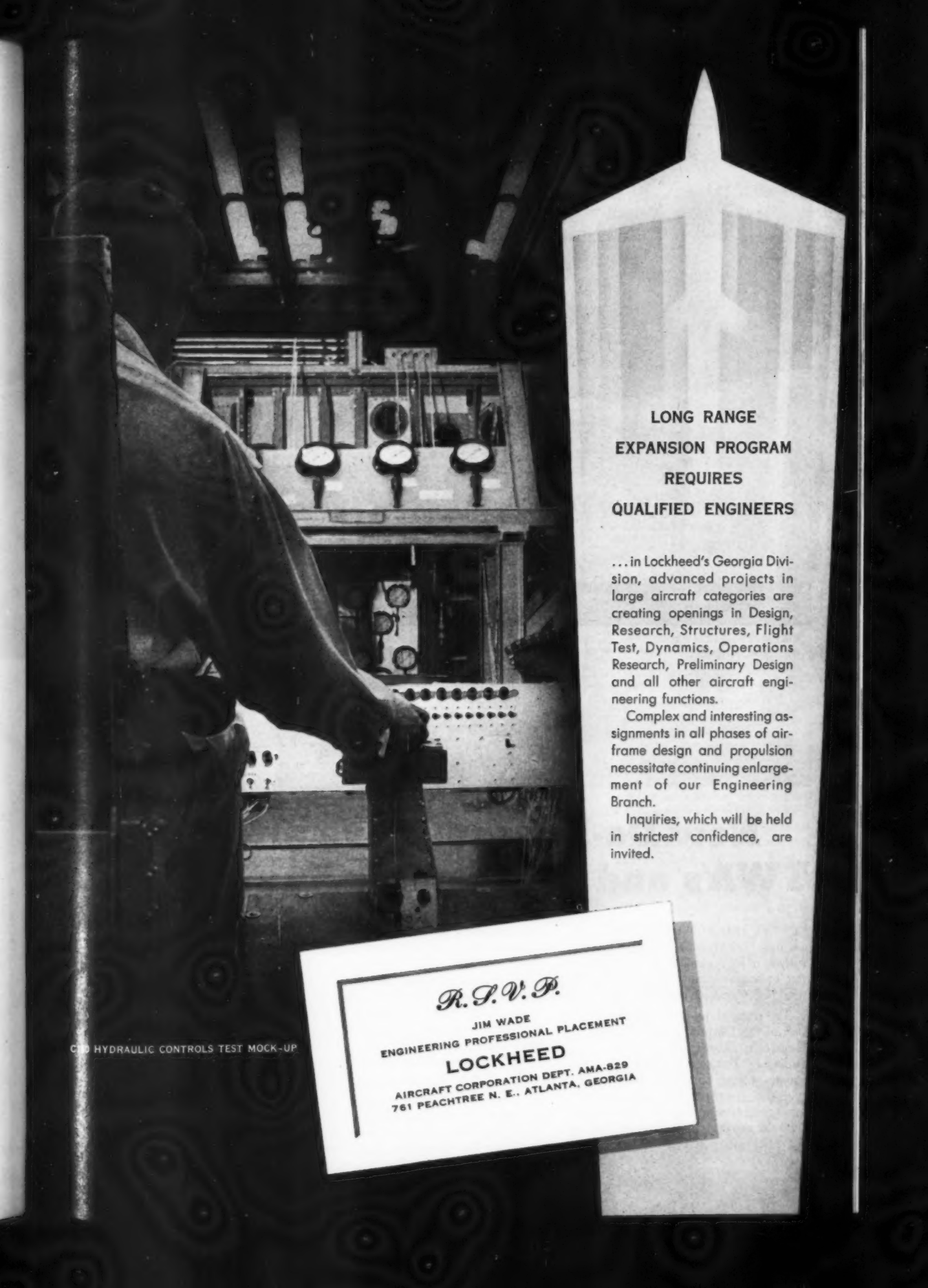
DECISION BY GENERAL ELECTRIC as to whether it will build the British Napier Eland turboprop engine under license will be made in the next several weeks. G-E reportedly holds an option on license rights to the Eland, and preparatory to its decision, has both studied its producibility at the Napier plant and spent considerable time with Lockheed Aircraft Corp. exploring its potential as a powerplant for the Electra.

NORTH AMERICAN AVIATION AND ROLLS-ROYCE, LTD. have entered into a 10-year technical assistance agreement under which the latter is licensed to build NAA-developed rocket engines. It presumably will include such high-thrust liquid propellant engines as that designed by North American to power the Chrysler Redstone missile.

Rolls-Royce negotiations with Westinghouse Electric Co. also are reported to have gained momentum. With prospects of RB-109 turboprop engine production in the U. S. now considered weakened by late timing for the Lockheed Electra, latest negotiations center around Rolls-Royce's most attractive model for a U. S. market—the Conway by-pass engine.

AIR FORCE WILL NOT SEEK ADDITIONAL FUNDS for 1956 to finance the speed-up in production of the McDonnell F-101 and Lockheed F-104 aircraft. Money was transferred from other projects to take care of the new orders.

A BREAKTHROUGH IN DEVELOPMENT OF TITANIUM apparently is closer than heretofore thought possible (see page 6) and one manufacturer of an unidentified fighter-type aircraft has said that 80% of the structural weight of the new plane will be in that metal.



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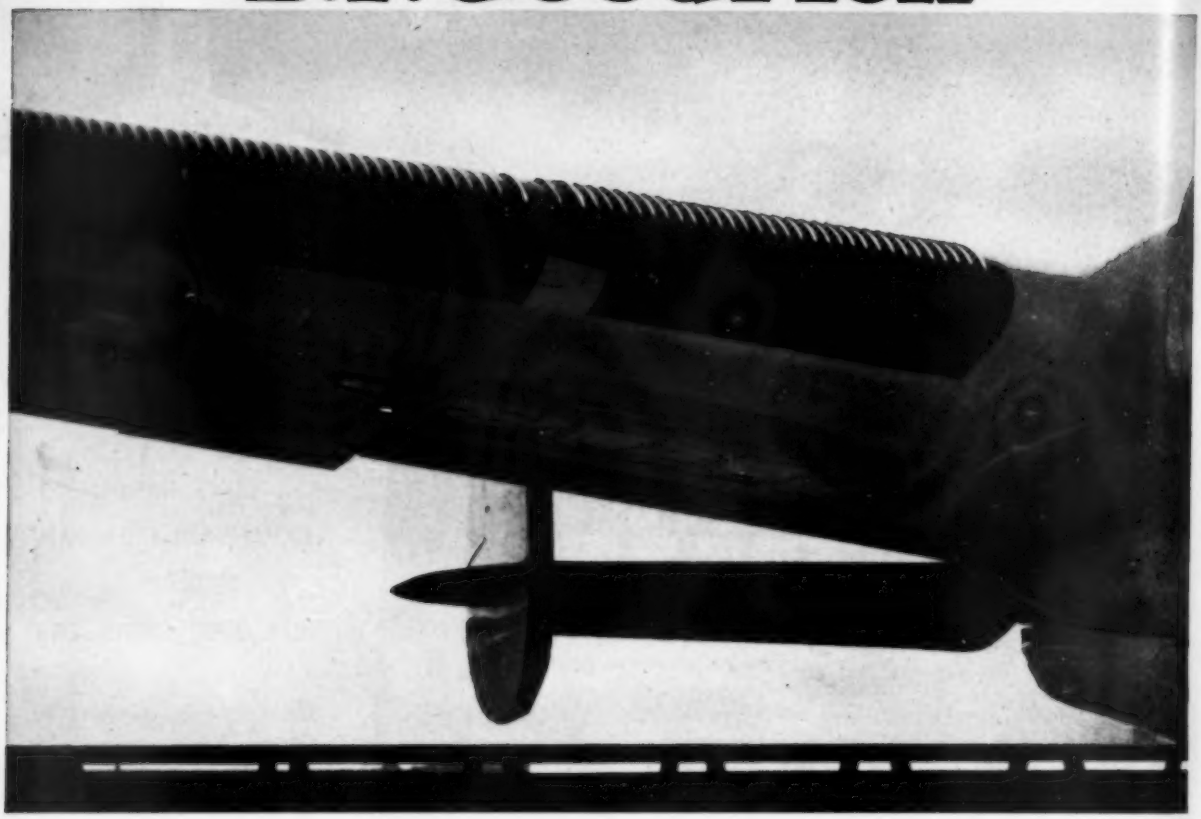

New De-Icers improve air flow on TWA's and Northwest's Super Connies

TWA'S AND NORTHWEST'S luxurious new Lockheed 1049-G's can successfully fight ice regardless of air speed and rate of accumulation. They're equipped with B. F. Goodrich pneumatic De-Icers.

Top photograph shows an important part of this De-Icing system—new B. F. Goodrich *chordwise* wing De-Icers (inflated). The small rubber tubes that inflate to snap off ice are built *in line* with the air stream. This improved tube arrangement smooths the flow of air over the wings at all times—even during the brief inflation cycle. Pilots report new *chordwise* De-Icers give the plane a "better feel"; do not alter its flight characteristics.

Extensive wind tunnel and flight tests prove that the ice removing efficiency of the new *chordwise* design equals performance of the B. F. Goodrich spanwise De-Icers that are used on the 1049-G's empennage and wing tip areas.

This B. F. Goodrich De-Icing system, with new *chordwise* De-Icers, was engineered specifically for the Super Connie. It's a typical example of how B. F. Goodrich can design ice protection to solve any icing problem. For other special applications, B. F. Goodrich has also paralleled De-Icer progress with developments in chemical and electrical ice protection.

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VOL. 19, NO. 7

R & D Slated for Bigger Role in Race To Win Technical Supremacy over USSR

By Robert M. Loebelson

RESEARCH AND DEVELOPMENT activities in the Air Force seem to be due for intensification as a result of selection of a top R&D man as Air Force Secretary and statements of top military and civilian leaders last week.

• **First of all,** the President and Defense Secretary Charles E. Wilson selected a man with a technical background, Donald A. Quarles (Assistant Defense Secretary for Research and Development), to be Harold E. Talbott's successor as Secretary of the Air Force.

• **Then Trevor Gardner,** Assistant AF Secretary for R&D, indicated the USAF has requested an additional $100 to $200 million for fiscal 1956 (the current fiscal year) to exploit recent technical breakthroughs. He did not elaborate on what specific fields the money is needed for but it is known that within the past six months, unexpected progress has been made in developing the atomic-powered bomber and the intercontinental ballistic guided missile.

• **Subsequently Dr. H. Guyford Stever,** chief scientist of the USAF, warned that "unless we do something radically different" the U. S. cannot win the race with Russia for future technical superiority. He pointed out that most experts believe this country has already lost the engineering manpower battle to the Soviets, who are devoting more interest to science than than the U.S.

Dr. Stever said the Russians are "excellent" in such fields as mathematical analysis, physics, chemistry, aerodynamics, non-linear mechanics, metallurgy and several other sciences of great importance in aeronautics.

• **Dr. Edward Teller,** father of the hydrogen bomb, made an appeal for greater emphasis on "useless," i.e., pure or basic, research before a luncheon meeting of the Air Force Association convention in San Francisco.

DONALD A. QUARLES

• **Lt. Gen. Thomas S. Power,** commander of the Air Research and Development Command, told a news conference at the AFA gathering that the USAF would expand the use of Phase I contracts (similar to the ones awarded to six companies for three new aircraft types, AMERICAN AVIATION, Aug. 15) to cover other advanced airplane models as well as new engines and advanced electronic and fire control equipment. Pse of Phase I development contracts is also being studied for possible application in the guided missile field, he said.

• **Gen. Edwin W. Rawlings,** commander of the Air Materiel Command, told the same news conference one early application of the Phase I technique (which is designed to shorten the time lag between the time a plane is on the drawing boards and the time it is in operational use) would be for a successor to the Boeing B-52. He and Gen. Power referred to both chemical power (e.g. boron) and atomic power as the logical propulsion systems for such an airplane, which would be truly intercontinental without the use of flight refueling.

Because several high USAF officials, and especially Assistant Secretary for Materiel Roger Lewis, have indicated that two companies—Boeing and Convair—are the only ones considered qualified to produce heavy bombers, it would appear that the Seattle and Fort Worth companies will get the Phase I contracts for the B-52 successor.)

Quarles' selection as Air Secretary came as something of a surprise to the aircraft industry, which had expected either a politician or a business executive to end up in the post. But apparently Defense Secretary Wilson and Mr. Eisenhower had made up their minds they wanted a man with, as one source described it, "a foot planted firmly in the future."

Such a man conceivably would urge military leaders (who have usually thought of fighting a future war with the weapons of the past, slightly improved) to use their imaginations more and speed the employment of such weapons as rockets and guided missiles.

Quarles, because of his background with such firms as Western Electric, Bell Telephone and Sandia Corp., and his knowledge of technical problems, appears to be a man with the foot in the future. He is acknowledged to be excellent in a technical post like his former one on the Defense Department level. As an administrator—and serving as AF Secretary is basically an administrative job—Quarles is pretty much unknown.

Just after his appointment (which is only a recess one until Congress reconvenes in January), the new Air Secretary provided several indications of where the Air Force will be headed while he administers it, specifically with regard to R&D. Said Quarles:

• **The AF's research program** is "generally sound" and no overnight changes are in prospect.

• **While missiles** will be increasingly important as supplementary weapons, he could "foresee no conditions under which we could discontinue" the use of manned combat aircraft.

• **He will continue** to stress "new weaponry" in his new post.

At the AFA convention in San Francisco, meanwhile, Assistant Secretary Gardner hailed Quarles' selection as an ideal one from the R&D standpoint. But he was quick to point out that he considers the AF's budget for R&D "inadequate" by rather large sums.

• **To narrow the gap,** Gardner called on the aircraft industry to put more of its own money into basic and advanced research. He pointed out that the five biggest industry firms last year sold $3.7 billion worth of airplanes. Yet, he added, these same companies only spent $2 million of their own cash into basic R&D. "With a backlog of more than $7 billion," he said, "these aircraft companies can certainly afford to spend more on research."

Gardner simultaneously turned aside industry complaints that too much of the Defense Department's R&D money is being spent with colleges, universities and other non-profit institutions. He said the Pentagon, which in the past has placed contracts for about 8% of its R&D money with these organizations (vs. 50-60% for industry and the remainder with governmental research organizations) would continue the present percentage and might even increase it slightly.

In the past the Aircraft Industries Association has urged Secretary Wilson to funnel contracts now placed with colleges to aviation firms.

New Policy Explained

The Assistant Secretary for R&D said the new policy of replacing design competitions for new aircraft, engines and equipment with Phase I contracts to companies with experience would not cause aviation firms to be reluctant to put their own funds into research.

This point was elaborated on by Gen. Power when he said that while the Phase I contracts would be given to experienced companies, the AF would maintain a policy of rewarding those who "build a better mousetrap."

• **The new technique,** Power declared, will not serve to freeze out companies not in the field. But he admitted that it is "not likely" that companies not now in the aviation field will be permitted to get in. He cited the fact that any aviation firm which comes up with a promising design with its own cash will undoubtedly get USAF support to continue, even though Phase I contracts for a competitive article are already underway. No aircraft or engine company, he added, will be expected to build a prototype with its own finances. "It's simply too expensive," he said.

ARDC's boss said the USAF has been trying for a long time to figure out the best way of shortening the development cycle for new planes and equipment. (It now takes up to eight years for a new bomber to reach squadron service after the design work starts).

To accomplish this, he reported, ARDC had set up a group to study past estimates made by contractors as to when a plane or piece of equipment would be available and the slippage that had ensued. All too frequently, Power declared, the USAF ended up taking delivery of obsolescent aircraft because of slippage and the requirement for design competitions.

Design Competitions Wasteful

• **Power also pointed out** that the design competitions frequently represented a waste of engineering manpower—a highly critical commodity. "We used to get entries from as many as 13 or 14 companies in our design competitions and some of those companies knew they didn't stand a chance. But they took the time of their engineers to work up proposals anyway. We can use that engineering time to better advantage this way," he said.

The new technique will mean that where a requirement for a specific airplane or piece of equipment exists, the AF will give Phase I contracts to two or more experienced companies for designs through the mockup stage. These firms may even both get prototype contracts if their designs are promising enough, Power indicated. But, he added, the AF must not be afraid to start projects which may fail.

"We must make big jumps from now on. We have to figure that as many as one in every five new projects we start will not work out. And we must be willing to drop projects which no longer have promise," he said.

Practical Evolution

• **Dr. Teller's appeal** for support of pure research stemmed from frequent Pentagon complaints that too many studies seem to have no direction. He cited the nuclear case: Practical evolution of both the atomic and the hydrogen bombs resulted from "long-hair" researchers being curious about cosmic rays.

In seeking additional large sums for the breakthroughs during the current fiscal year, the USAF has already sent its request up to the Defense Department level. The additional $100-$200 million being sought has not yet reached the Bureau of the Budget for approval, however.

One complication in this respect is the fact that next January (when the AF's supplemental R&D request is to be submitted to Congress) both the Republican Administration and the Democratic lawmakers will be trying to reduce taxes and not increase the deficit. After all, 1956 is presidential election year. And it may prove difficult to get the supplemental request through for that reason.

• **What will happen** if the added funds are not forthcoming? Will some hopeful projects have to be canceled? Gen. Power provided the answers by declaring, "It's more complicated than simply stating that some R&D projects will have to be canceled. In some cases, we simply won't start on new approaches. In others we may have to delay or cancel existing research for lack of funds.

Certain facts about the relative merits of the U. S. and Russian air forces are self evident:

• The Soviets have put more resources into aircraft production during the past few years than this country.

• Russia has also expanded aeronautical research and development during the same period to a point where she has come dangerously close, or has possibly even overtaken, America's technical lead.

• Technical schools of the Soviet Union are turning out far more engineers and scientists each year than those in the U.S.

• Crash production programs, resulting in large-scale output of planes and equipment, after a war starts will no longer serve the purpose. U.S. production capacity has been reduced to a relatively minor role now that the Soviets have both hydrogen bombs and the planes to deliver them.

Step-up is Vital

To cope with these unexpected facts of life, the USAF has little choice. Knowing that the aviation industry is quite capable of large-scale output both before and after the need for it arises, the U.S. can only step up research activities to an even greater degree than before in hopes that it will be sufficient.

The men running the Air Force are fully aware of the situation and have called for more R&D for the past several years, both applied and basic. Yet the tendency has been to submerge basic R&D to more immediate requirements.

Quarles and the men around him may not be satisfied with what Gardner calls "inadequate" R&D sums in the future. There will certainly be increased R&D requests when the fiscal 1957 budget is submitted, especially since the procurement money being sought will probably drop off as the USAF nears its current goal of 137 wings. • • •

Masefield Sees $7-Billion Market For Jets, Turboprops

• Need for 2,700 aircraft in next 10 years, IAS session hears.

By JOSEPH S. MURPHY

A multi-billion dollar requirement for jet and turboprop transports means big business by any set of standards, and that's exactly what one top airline official predicts for the world's air carriers in the not too distant future.

That official is Peter Masefield, chief executive of British European Airways, whose airline pioneered service with the first turboprop—the highly successful Vickers Viscount.

Masefield's prediction came early this month during the Institute of the Aeronautical Sciences' 2nd Annual Turbine Transport Meeting in Seattle. He gave close to 500 engineers in attendance this forecast of airline equipment needs over the next ten years:

• **Between 1958 and 1966** carriers will require some 2,700 jet and turboprop aircraft and helicopters of seven different types valued at more than $7-billion with spares.

• **In major aircraft types** (excluding a "DC-3 replacement" and helicopters) demand will call for 300 four-engine jets and 1,300 four-engine turboprops—a 4-to-1 ratio in favor of the turboprop.

• **In dollar value,** jet orders will be worth $1.8 billion against $4 billion for turboprops— a 2-to-1 financial ratio.

• **Initial engine demand** will involve 1,800 jets of two types and about 13,400 turboprops of four types.

Here are the seven types of aircraft in Masefield's 1958-1966 forecast:

• **Long Range Jet**—The blue ribbon or "No. One Prestige Type" airplane, a straight jet designed to fly transcontinental nonstop and transatlantic nonstop with high regularity from London to New York. Seating more than 100 passengers and cruising at about 550 mph, this jet will eventually gross close to 300,000 pounds.

World market for this aircraft is placed at about 200 representing a $1.5-billion investment including spares. Only present contenders named by the BEA official are the Douglas DC-8 and Boeing 707, implying some question as to the future of the Vickers V.1000 by-pass powered jet which obviously fits this category.

• **Long Range Turboprop**—A "second-class" transport that will parallel the nonstop capabilities of the long-range jet, but flying about 100 mph slower and operating 20 percent cheaper. It will carry a 20,000-pound or 100-passenger payload and gross about 180,000 pounds.

Aircraft cost will be about $3.5-million per copy and an estimated world market of 400 with spares will be worth $1.5 billion. Britain's Bristol Britannia and a turboprop version of the Lockheed 1649 are considered the only present candidates in this class.

• **Medium Range Jet**—A 2,000-mile range jet grossing about 150,000 pounds and capable of carrying 70 passengers at 500-mph speeds. Costing about $2.5 million each, this jet will attract a "somewhat restricted" market of 100 aircraft or a total market value with spares of $300 million. Britain's de Havilland Comet 4, due to enter service in two years, is "right in this class," according to Masefield.

• **Medium Range Turboprop**—A "work-horse" transport cruising at better than 400 mph, this turboprop will seat between 70 and 90 passengers, weigh about 100,000 pounds, and sell for less than $2 million.

Airline investment of $1.5 billion will involve 500 aircraft including spares, with the Lockheed Electra and "Viscount Successor" vying for the business.

• **Medium/Short-Haul Turboprop**—A "second-string" turboprop weighing about 65,000 pounds gross and capable of carrying 50 to 60 passengers at a 350 mph cruising speed. At $1 million each, some 400 of these turboprops with spares will represent a $600-million market. Leading contender is the Vickers Viscount-Major with the higher powered Dart engine.

• **"DC-3 Replacement"**—A relatively small and cheap aircraft, preferably using four turboprops of about 600 or 700 horsepower each, will carry 30 or "a few less" passengers and cruise at about 200 mph. Gross weight will be about 20,000 pounds and cost about $400,000 each.

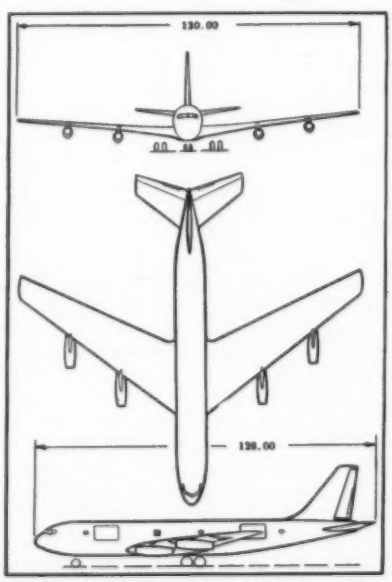
Market for this aircraft, although "difficult to guess," is placed by Masefield at approximately 600 aircraft. Value with spares would run around $350 million. No aircraft has been designed quite in this category at present, he noted.

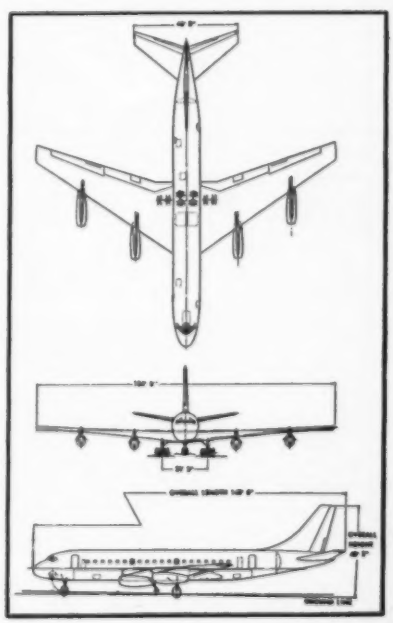
• **Large Helicopter**—A multi-engine helicopter capable of flying 250 miles between large city centers at speeds of not less than 150 mph. Power plants will be two or possibly four turboprops with at least 8,000 total shaft horsepower.

At 60,000 pounds take-off gross, cost of the helicopter will be at least $1.5 million per copy. If such a vehicle can be produced in the next ten years, Masefield feels, at least 500 could be sold at a market value in excess of $1 billion.

Masefield's views on the coming jet era highlighted the three day IAS session which also heard:

• New details on the Douglas DC-8.





COMPARATIVE THREE-VIEWS show similarity of Boeing 707 (above) and Douglas DC-8 (right).

NEW BID for airport arresting gear, such as that shown here at Republic Aviation's Farmingdale, N. Y. field, was made at IAS session by United Air Lines' R. D. Kelly. Nylon web barrier is produced by The Boyt Co., Des Moines, Ia.

• First repercussions from CAA handling of the Vickers Viscount turboprop certification.

• A strong bid for airport arresting gear to improve jet transport ground safety.

• Some statistics on jet engine experience.

• An up-to-the minute report on Boeing's 707 program.

DC-8 Economics

Douglas' DC-8 entry in the jet transport field will be economically superior to the DC-7C in long-range overwater versions and its domestic counterpart will surpass the economy of the Douglas DC-6B at shorter ranges, Ivar L. Shogran told IAS.

In Paris-New York service, the Douglas DC-8 project engineer said, lower DC-8 direct operating costs per 200-pound nautical mile will cut costs by approximately 40%. In London-New York service the reduction amounts to about 30%, and at 500-nautical-mile ranges, the DC-8 still maintains an economic advantage of 25%.

Shogran disclosed these new details of DC-8 design:

• **Landing Gear**—Douglas jet will have a "coaxial quad" type main landing gear which will allow pivoting around either main gear for maximum maneuverability in ramp operations. Each main gear will mount four tires, two on each side of the strut, using a single wheel for each pair of tires.

This design differs sharply from the tandem wheel arrangement employed to date on other heavy jets in which main gear wheels are mounted in pairs fore and aft of the gear strut. Boeing plans this latter layout for its 707 jet transport.

• **Cabin Doors**—DC-8 cabin will be fitted with two passenger entrances, one fore and one aft, to speed loading and unloading of passengers. This arrangement, Shogran said, will be ideally suited for combination first class/tourist operations providing separate entrances for the two types of service.

• **Speed Brake**—DC-8 flight brake will be under-fuselage mounted as opposed to over-wing lateral control spoilers on the Boeing 707, which serve a dual role as flight brakes. Wing sweepback on the DC-8 will be 30 degrees compared with 35 degrees on the Boeing 707.

Viscount Certification

Although current operation of Vickers Viscount turboprops in the U.S. is unlikely to be seriously penalized by special conditions imposed by CAA in certification, there are aspects which deserve further review because of their inconsistency or arbitrary nature, D. J. Lambert of Vickers-Armstrong Ltd. told the session.

The Vickers chief development engineer referred primarily to temperature accountability requirements and CAA refusal to accept the British so-called "rational performance" concept. As a result, he said, there are cases where a Viscount operator might be forced to off-load revenue traffic to a competitive piston engine transport due to temperature accountability restrictions, although the piston transport would be incapable of meeting performance margins while the turboprop would retain full standard performance.

CAA's Henry Weeks defended the "special conditions" set down for the Viscount as the outgrowth of an understandable reluctance to recommend basic changes in U.S. rules without assurance they would maintain or improve the excellent safety record achieved under established CAR 4b standards.

Weeks indicated, however, that should CAA's approach to Viscount certification be improved and refined as experience is gained, earlier approvals such as that of the Viscount will be given the benefit of any future changes and improvements.

Airport Arresting Gear

• **A strong bid** for installation of arresting gear on airport runways to prevent jet aircraft from over-running airport boundaries, made by United Air Lines' R. D. Kelly, met with unanimous support among airline officials.

Kelly said the larger numbers of people likely to be involved in any one ground accident, much greater fuel quantities, higher speeds and much greater energies tied up in a jet transport make it absolutely necessary that every facet of ground operation be examined to eliminate hazards.

Early action on airport arresting gear at this time, he feels, would make them available for the very beginning of jet transport operations and would provide relatively inexpensive insurance of equal interest to passengers, airlines, airport managements and local communities.

J47 Jet Experience

• **General Electric's** manager-marketing J. D. Wethe told the IAS session that some 35,000 J47 jet engines shipped to the military services since 1948 are now amassing some 11,000 flight hours daily. Of this total, some 30,000 engines have seen service and, on the average day, 12,000 are installed and in operating service.

G-E's experience with IBM equipment for service analysis of engine experience has played a key role in improving J47 service characteristics, Wethe said. More than 20,000 design improvements have gone into the engine during its eight-year existence and thrust has been increased more than 23%. Both service life and reliability have been extended beyond expectation to such an extent that more than 2,500 engines have been cancelled from existing contracts.

Current overhaul time for J47s on B-47 aircraft is 1,200 hours compared with a 150-hour limit five years ago, Wethe reported, with further increases still to come in the months ahead.

• **In a recent G-E survey** of 126 representative engines, average overhaul time was 583.5 hours per engine and total overhaul parts costs ran $152,926.82. Average cost per engine for parts was $1,676.12 or $2.87 per flight hour.

Biggest single cause for premature removal of the engines studied was foreign object damage, accounting for 58 engines or 46% of the total surveyed. In the entire B-47 program, J47s have

FLYING BOOM for Boeing's 707 jet tanker-transport prototype, shown in this close-up, will be used for evaluating KC-135 tanker's in-flight refueling system.

experienced 13 turbine failures, the equivalent of one every 290,000 engine hours.

However, of this 13, Wethe said, seven failed during or immediately after in-flight refueling operations and five others are believed to have been caused by flight refueling, an operation not anticipated in future jet transport service. Turbine over-temperature conditions resulting from acceleration and deceleration during refueling is considered the prevailing cause of this type of failure.

Boeing 707 Progress

• Boeing Airplane Co.'s 707 prototype aircraft, now in its second phase of flight testing following installation of flying boom for KC-135 tanker evaluation tests, has proven a most sound method of getting refinements into first production aircraft, Boeing's chief engineer George C. Martin told the engineering session.

Major examples of such refinements developed from prototype flying to date include a rework to the brake system, control system changes, and modifications to the adjustable stabilizer drive system—all designed to permit trouble-free operation on production aircraft.

Future program for the prototype, Martin said, calls for the flying boom evaluation, engine thrust reverser tests, further testing of a-c electrical system installation, and test bed flying of new engines.

Satisfactory Tests

First 707 thrust reverser tests, conducted by Boeing recently to check installation details, were described as "very satisfactory." Although no performance details were furnished, tests were conducted at 85-knot ground speed with 100% reverse applied to a single installation on the No. 2 engine.

As to newer powerplants for the prototype, Martin said the prototype airplane is capable of operating with engines of twice the thrust rating of presently fitted Pratt & Whitney J57s. With this capability, the prototype is being planned for use throughout the development of a family of jet transports and tankers up to 380,000 pounds gross—from two to two and one-half times its present weight. • • •

Slick Orders Five 1049H Super Connies

Slick Airways has ordered five 1049H Super Constellations for delivery during the first quarter of 1957. Price, including spares: approximately $11 million.

Planes will have cargo interiors, but will include windows so they may be converted for passenger service if desired. Slick's present fleet includes three DC-6As, 17 C-46s and three DC-4s. Company expects a 32% increase in operations this year to a total of more than 43 million ton-miles.

C-W First Half Net Over $15 Million

Curtiss-Wright Corp. reports a net income after taxes of $15,065,859 for the first six months of 1955, almost a 100% increase over $7,569,443 for the same period last year.

C-W's consolidated sales through June this year totaled $250,072,134, up from $234,550,689 reported last year. Corporation backlog of unfilled orders on June 30 stood at $818,000,000.

Harris Heads New Firm

Harold R. Harris, former president of Northwest Airlines, has joined Aviation Financial Services, Inc., newly formed airline finance company, as chief officer. The company plans to arrange financing of aircraft needs of airlines and other corporations that use aircraft for corporate purposes.

GRUMMAN F11F-1 SUPERSONIC NAVY FIGHTER is shown during current evaluation and demonstration tests. The thin-wing fighter is powered by a Wright J65-W-7 engine with afterburner and is designed for supersonic speed in level flight. Production models are coming off Grumman's Peconic River assembly line.

How Federal Airport Aid Program Will Work

Because of the importance of the new $251-million airport aid program and the new aid concepts contained in the law, AMERICAN AVIATION prepared a list of questions to clarify the change-over. The answers were supplied by Commerce Dept. and Civil Aeronautics Administration.

Q. Just how does the contract authorization principle contained in the new federal airport law actually work?

A. It permits obligation of authority in the same manner as the Federal Highway Program which is later covered in the appropriation of liquidating cash by the Department of Commerce. The sponsors are given the advantage of a long-range guarantee. Only by empowering such advance contract authority can Congress guarantee funds in future years.

Q. What are the advantages over the annual appropriation system used previously under the Federal Airport Act of 1946?

A. (1) The sponsors receive assurance of a continuing program in future years. (2) Provides CAA with the ability to program tentative allocations well in advance of the fiscal year. (3) Provides the ability to give sponsors tentative allocations in future fiscal years for accomplishment of a development which must be undertaken in stages.

Q. How far in advance may CAA enter into grant agreements with sponsors for the new four-year program?

A. CAA may program projects well in advance but cannot enter into actual grant agreements until the fiscal year for which the authority is given.

Q. How far in advance can a sponsor apply for and get tentative allocation for project aid?

A. CAA can make tentative allocations to a sponsor for the whole four year period (fiscal 1956-fiscal 1959) if project is deemed justifiable. This would usually apply to a packaged stage development project, i.e., terminal building and area. CAA can program apron paving for fiscal 1956; part of the building in 1957, etc.

Q. Just how far can CAA go in assuring aid to a specific sponsor in developing his long range plans?

A. CAA can program tentative allocations well in advance in its National Airport Plan, although it cannot actually obligate money until the fiscal year for which it is available. Because of this, the National Airport Plan will take on greater importance than it has ever had.

Q. Is there any chance that the annual appropriations can be cut despite the contract authority granted?

A. No. Congress has firmly obligated itself to make the funds available and this could only be changed by new legislation. The application for liquidating cash by the Department of Commerce is just a routine procedure.

Q. Congress made it clear that the restrictive 30 based planes and/or 3,000 enplaned passenger criteria used in fiscal 1955 was not to be applied in the future. What type of criteria will be needed to get the maximum benefit from the enlarged program?

A. Broadly, CAA will program those projects that are needed for safety. Second on the priority rung will be those needed for efficiency in operation and third will come those needed for convenience.

As to eligible airports, it is felt that some yardstick will still be needed. Chances are that the old criteria of 10 based plans and/or 1000 enplaned passengers annually will be reinstated with appropriate modifiers.

Q. Will industry have a voice in establishing policies, procedures and planning?

A. Yes. CAA Administrator Fred B. Lee is serving as chairman of a group of 11 industry representatives from national associations, including users, operators, and builders. Several meetings have already been held and more are scheduled. The advisory group is a temporary one and will be abandoned when policy is established in about 30 days.

Q. The law specifies that no project items are to be considered ineligible with the exception of hangars, meaning that terminal buildings and other types of development under the Federal Airport Act are to receive aid. How will this be controlled?

A. Such items as terminal buildings will probably be put in the number 3 priority rating of "convenience." In order to prevent overbuilding as experienced in the past, traffic statistics and projections will be widely used in determining the type of building needed at a specific airport and will determine the extent of federal participation. Federal aid will be limited to what is needed. "Extras" will be at the sponsor's expense. CAA currently is attempting to determine what other items, previously excluded, could become eligible, to what extent, and under what circumstances, i.e., hangar aprons, sewer systems, electrical wiring, etc.

Q. Can sponsors claim any retroactive aid under the new law.

A. No. The obligation must have been incurred subsequent to a grant agreement with the following exceptions. Sponsors may be reimbursed for land purchases and for planning costs incurred in development of master plans.

Q. Will state and local governments play a stronger role in program planning?

A. Yes. CAA will endeavor to better coordinate the National airport plan with both state and local officials with less arbitrary decisions being made in Washington.

Q. The new law extends to two years the time which state apportioned funds will remain available in the designated states. Does this mean the individual sponsors will have the extension passed down to them?

A. No. It just means that it remains in the state apportionment. If a sponsor does not show good intentions of trying to raise matching funds or proceed with preliminary project work within a reasonable time limit the tentative allocation will be forfeited and returned to the state for apportionment to another project within the state.

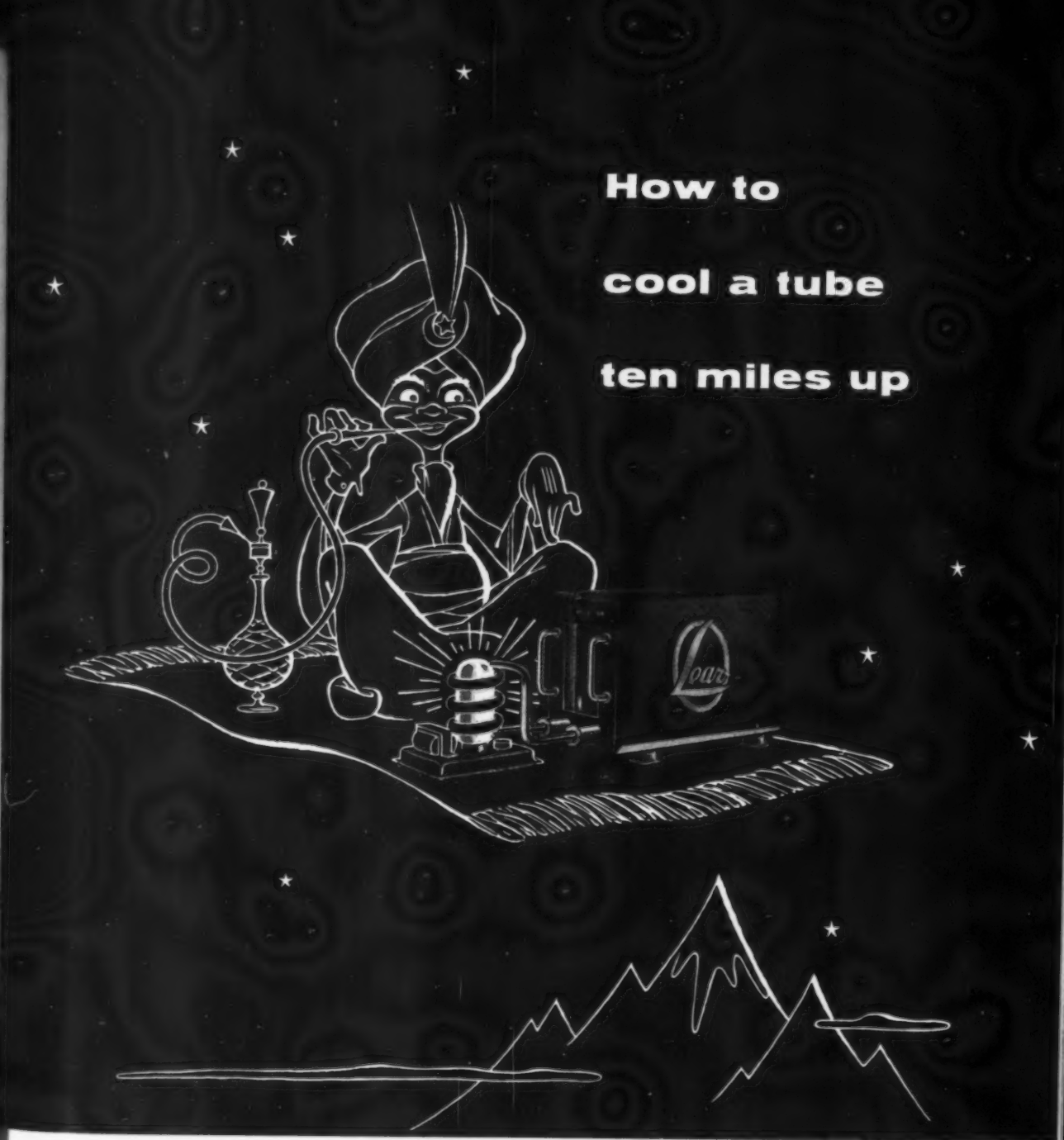
Q. What is the new deadline for the National Airport Plan revisions?

A. March 31, three months earlier than in prior years.

Q. Is stage construction encouraged under the new law?

A. The act itself encourages it by encouraging long range planning, thus providing sponsors with four years of development rather than psychologically compelling them to accordion all future development into one year.

(*Continued on page* 28)



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Q. What is the future of the authorization act after the four year period is concluded?

A. If properly administered and if it proves to have accomplished its designated purpose, there is a good chance that it will be extended for a two-year period from then on. The four-year authorization was allowed this time because of the large backlog of accumulated need for development. But if extended in the future it can easily follow the Highway formula of succeeding two-year authorizations.

Q. CAA's airport division underwent severe personnel cutbacks as the federal aid program diminished over the last couple of years. What new staffing will be needed to administer the quarter-of-a-billion dollar program?

A. There are no plans to open any new district offices, but new field personnel, mostly engineers, will be assigned to district and regional offices if funds are appropriated. There are currently 302 positions to administer all functions of the Office of Airports and it is estimated that between 75 to 100 more will be needed, the majority for field assignments.

Q. The $20 million appropriated under the Department of Commerce budget has been programmed under the old criteria. Does this mean it will not be subject to the other provisions of the authorization law?

A. The $20 million was programmed in order to avoid undue delay. A legal ruling is now being sought by CAA on whether it is subject to the provisions of the new law.

Q. When will the $42.5 million be programmed for fiscal 1956?

A. CAA hopes to have its procedures, policies and planning completely set by October 1 with new and revised applications under processing. A completed program is expected to be announced around December or possibly earlier. • • •

X-2 Program Resumed after Two-Year Delay

The Bell X-2 test program is being resumed after a two-year delay caused by crash of the original stainless steel rocket-powered aircraft.

Lt. Col. Frank K. Everest, chief of Flight Test Operations Laboratory at Edwards AFB, Calif., will fly the second X-2 when its Curtiss-Wright XLR-25 throttleable rocket engine is fitted into the aircraft.

The original X-2, powered by a similar C-W engine, was lost when it exploded and crashed into Lake Ontario May 13, 1953. Bell test pilot "Skip" Ziegler was at the controls.

The X-2 is designed to probe the 1,000°F temperatures encountered beyond the 1,650 mph speed set by the Bell X-1A and to exceed the altitude of 90,000 feet reached by the X-1A.

The X-2 is a joint product of Bell, Air Force and NACA.

Seaboard Acquires 2 More Super Connies

Seaboard & Western Airlines, recently certificated by Civil Aeronautics Board for scheduled transatlantic all-cargo service, has purchased two Lockheed 1049H Super Constellation freighters.

Seaboard presently operates four 1049Ds, first all-freight version of the Super Connie. Company also has six DC-4s. New planes, scheduled for delivery in January 1957, cost $4 million, including spares.

AA's Earnings Up 70% In First Half of '55

American Airlines Inc. has announced net earnings of $8,537,000 for the first six months of 1955, a 70% increase over earnings for the corresponding period of 1954. Net earnings for the first half of last year were $5,014,000. They included profit after taxes of $903,000 on the sale of four planes.

AA's board of directors declared the regular quarterly dividend of 87¢ per share of the corporation's cumulative convertible preferred stock and a dividend of 20¢ per share on the $1.00 par value common stock. Both dividends are payable September 1 to stockholders of record August 18.

Defense Department De-classifies Tacan

Long-awaited removal of security wraps from Federal Telecommunication Laboratories' Military Tacan navigation system has opened the door for free discussion at technical levels of its relative merits as a future common-system short range navigation aid. Because of the wide interest in details of Tacan, an edited text of the system description released by Air Navigation Development Board is presented herewith:

Tacan is an integrated bearing and distance navigation aid operating in the 962-1213 megacycle range and providing navigation information to a line of sight distance of 200 nautical miles. Cockpit display is identical to that of current VOR/DME equipment.

The system provides bearing accuracy of ±1° and distance accuracy of ±600 ft., plus 0.15% of the distance measured when the ground antenna is sited for optimum results. Best siting requires a tower to assure that radiated energy from ground equipment clears all nearby objects.

• **Cone of confusion** (no signal area) of present Tacan is 110°. However, there is a good chance this angle will be decreased in subsequent models. Voice communication is not now included although added service is possible in the one-megacycle wide channel used.

Airborne Tacan mounts in a one-ATR rack, weighs 65 pounds including shock mounting, contains 76 tubes and uses 500 watts power. A single ground unit uses 13 kilowatts of 110/220 volt, 3-phase power and is housed in two 6-ft. high relay racks with space for built-in test equipment.

Ground antenna and drive motor is six feet in height and 3½ feet in diameter. Assembly weight is 450 pounds. Outer cylinders of the antenna contain parasitic elements which rotate at 900 rpm to provide modulation of the signal to give bearing information.

Tacan Ground Equipment

• **Tacan ground equipment** can transmit on any one of the 126 one-mc channels in the frequency ranges 962-1024 and 1151-1213 mc. The ground receiver operates on a frequency 63 mc above transmitter frequency in the lower range (channels 1 to 63), and 63 mc below in the higher range. A composite azimuth and distance reply signal transmitted by the ground beacon consists of 3.2 microsecond (μ sec.) pulses transmitted in pairs with a pulse spacing of 12 μ sec.

A total of 3,600 pulse pairs are transmitted per second. Of these, 2,700 pulse pairs are random in-time and include synchronized replies to distance interrogations from aircraft. The remaining 900 pulse pairs consist of: 12 pairs of pulses spaced 30 μ sec. (known as main reference pulse group and eight groups of six pulse pairs (auxiliary pulse reference group) spaced 24 μ sec. and transmitted 15 times per second as the antenna rotates. Morse code identification is provided by keying the transmitter to substitute a fixed repetition rate of 2,700 pulse pairs per second for random pairs when the key is down.

• **To provide azimuth information,** pulsed radio frequency output of the transmitter is amplitude modulated by the antenna system. The antenna consists of a vertically polarized stationary array around which two sets of parasitic elements contained in cylinders rotate in a clockwise direction.

Tacan antenna rotates at 15 revolutions per second. The inner cylinder contains one parasitic element and modulates the pulse amplitude of the receiver at 15 cps. The other cylinder contains nine elements and superimposes a 135 cps modulation on the fundamental 15-cps modulated signal

Bearing with respect to the surface beacon is determined at the aircraft by comparing time of occurrence of the reference pulse groups to the phase of the amplitude modulation produced by the ground antenna rotation.

Random pulse-pairs are triggered by noise when no signal is received by the ground receiver, but if a pair with 12 μ sec. spacing is received, the ground receiver replies to it. Thus distance from the beacon is determined in the aircraft by measuring the time interval between interrogation and reply.

Airborne Tacan

• **Airborne Tacan** consists of a receiver, transmitter and auxiliary equipment. Its function is to extract bearing data, by comparing the occurrence of ground transmitted pulse-groups with the phase of the amplitude modulation of the pulses, and determining distance from the ground station by interrogating and measuring the interval between interrogation and reply.

Airborne receiver operates in the same frequency range as the ground transmitter, that is, from 962-1024 mc and from 1151-1213 mc. The airborne interrogator transmits on channels from 1025-1150 μ sec./sec. The receiver frequency is 63 mc below transmitter frequency in channels 1-63 and 63 mc above transmitter frequency in channels 64-126. The equipment transmits and receive pairs of 3.5 μ sec. pulses spaces 12 μ sec. apart. Peak power of transmitted pulses is 2 kw and receiver sensitivity is 120 db below one watt.

One megacycle selectivity in the airborne receiver is achieved by use of a Ferris discriminator. For signals of more than one megacycle per second off frequency, attenuation is never less than 70 db down. The local oscillator operates on the transmitter frequency, resulting in the intermediate frequency of 63 mc.

Worst spurious response is 70 db down below the true response and occurs at 42 mc above the receiver frequency in channels 1 to 42, and 42 mc below receiver frequency in channels 84 to 126. Response at the image frequency is about 80 db down.

Receiver Operation

• **Operation of the Tacan receiver** circuitry after the decoder can be divided into azimuth and range. Each part has two conditions of operation—search and track.

Heading information is derived by comparing the time of occurrence of the reference pulse groups with the phase of the amplitude modulation produced by antenna rotation. The 15 cps modulation and the east reference group, which occurs 15 times per second, are used to establish the 40-degree sector in which the aircraft is located. The 135-cycle modulation and the auxiliary reference groups serve as a vernier to locate the aircraft accurately within the already-determined 40-degree sector.

Basic circuit operation is the same at both frequencies; a gate formed from the sinusoidal modulation signal is used to open the pulse channel for a short time during each cycle and the time of occurrence of this gate is varied by changing the phase of the sinusoidal signal in a rotary phase shifter.

• **Two phase-shifters** are geared together in such a way that the 135-cycle shifter turns nine times while the 15-cycle shifter is turning once. This geared assembly is motor driven and is continuously rotated during search. When the north reference group occurs at the time of the 15-cycle gate, the output of the pulse channel closes a relay putting the equipment into track condition.

In this condition, the motor is connected to a servo system actuated

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The Boeing KC-135 jet tanker-transport is of vital importance to the national defense. The prototype of this airplane—America's first jet transport—is shown above. To produce and deliver KC-135s to the Air Force as rapidly as possible, Boeing enlisted the aid of Twin Coach Aircraft Division as a subcontractor for major airframe assemblies.

This important assignment typifies the way prime contractors rely on Twin Coach Aircraft Division. For Twin is staffed with experienced aircraft specialists to design and build tooling . . . with experienced aircraft production personnel . . . under experienced aircraft supervision and management.

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by the output of the auxiliary reference group channel and operates so that the 135-cycle gate is kept centered around the pulse from the auxiliary reference group. The azimuthal angle is obtained from the position of the gear train when the pulse is centered in the gate.

Distance Measuring

• **The distance-measuring** circuits depend on a 4,044 cps crystal-controlled oscillator. The transmitter is triggered by a pulse generated from the oscillator output, and a number of cycles later another pulse is used to open a range gate. The number of cycles between pulse transmission and gate opening is determined by the setting of a motor-driven potentiometer. Geared to this unit is a phase-shifter which permits the time delay between pulse transmission and gate opening to be continuously variable.

During the search condition, the motor increases this time delay until a reply pulse from the ground transmitter falls within the range gate. The search-to-track relay is then actuated to connect the motor to a servo system centering the reply pulse in the gate. The angular position of the ganged potentiometer and phase-shifter indicates the range of the aircraft from the ground station.

Repetition rate of the transmitted pulses during search is about 150 pulses per second, and during track about 30 pulses per second. A "jitter" is deliberately introduced in the repetition rate of interrogations to eliminate the danger of synchronism between interrogations and replies for different aircraft. This is accomplished by establishing an average repetition rate, using a free-running multi-vibrator.

• **This circuit generates** either the 150- or 30-cycle gate for the transmitter. The 4,044-cycle ranging pulses are fed to this gate so that the first pulse arriving after the gate opens triggers the transmitter. The smallest increment of "jitter" corresponds to the period of the oscillator, or 248 microseconds.

Since it is necessary to detect 15-cycle modulation in the airborne receiver, time constants of the automatic gain control circuits are long in comparison to 1/15 seconds. Actually, the automatic gain control will follow a signal decreasing at a rate of 10 db per second.

About 20 seconds are required for the airborne receiver to complete a search cycle of 200 miles in range and 360° in azimuth. However, it takes only one second to establish a correct reading after the pulses start to fall in the gates.

Douglas X-3 Ejects Pilot Downward To Overcome Supersonic Problems

An improved method of bailing pilots out of supersonic aircraft, employing a new-type downward ejection seat, has been engineered by the Douglas Aircraft Company and the Air Research and Development Command.

The seat is stabilized in an upward position after ejection by two fins. A pilot forced to abandon his plane at high altitude rides the seat down quickly to 15,000 feet, where he is separated from it automatically and lowered to the ground by conventional parachute.

DOUGLAS X-3 downward ejection seat was engineered to overcome stability problems encountered in bailouts at supersonic, transonic and subsonic speeds.

At lower altitudes, pilot and chute are cleared from the seat within three seconds. The entire automatic sequence of events is triggered by two rapid-fire movements of the hand.

The escape system was devised for the Douglas X-3 research plane. Downward rather than upward ejection was designed into the X-3 for two reasons: the force required to shoot an ejection seat up and over the tail at advanced speeds is beyond human endurance, and an upward opening canopy would have created serious drag resistance to the plane's flight.

In high-speed sled tests, Lt. Col. John Stapp found that the human body can withstand forces encountered in supersonic bailouts if seated upright in relation to the direction of the force. Main problem for the designers was to stabilize the seat during the bailout. Ordinarily a seat tumbles violently in the high-speed air stream.

When the X-3 project was launched, data on aerodynamic characteristics of such an oddly-shaped body as an airplane seat were lacking. Exhaustive wind tunnel tests on a miniature model of the seat provided information which resulted in the use of fins. Later tests with a full-sized seat confirmed this finding.

New Routes Proposed For Riddle, AAXICO

There is a continued need for all-cargo operations in the east and it should be filled for the next five years by Riddle Airlines and American Air Export and Import Co., CAB Examiner James S. Keith found this month.

In a report on the North-South phase of the Air Freight Renewal Case, Keith recommended against renewal of the certificate issued in 1949 to U.S. Airlines, Inc.

He found that company, which has not operated since 1953, failing to meet the standards of fitness, willingness and ability because "it does not have adequate financial resources, is inadequately staffed, and possesses no plan of operation."

• **Riddle,** which holds an all-cargo certificate for U.S.-Puerto Rico operations and engages in non-certificated type domestic cargo operations, would get the following routes under Keith's proposal:

(A) Between the terminal Boston, intermediates New York, Philadelphia, Baltimore, Washington, Richmond, Jacksonville and beyond on one leg to Tampa, Sarasota and Miami, and on another to Palatka, Orlando, Fort Pierce, Stuart, and Miami.

(B) Between the terminal Miami, the same Florida intermediates as above, and beyond Jacksonville to Atlanta, Louisville, Indianapolis and Chicago. Also another leg from Atlanta to Cincinnati, Columbus, Cleveland and Detroit.

• **AAXICO since 1946** has concentrated on freight operations between the U.S. and Latin America, within South America, and for the Defense Department. Under Keith's proposal it would get these routes:

(A) Between New York, Philadelphia, Baltimore, Washington, Richmond, Atlanta, Birmingham and New Orleans.

(B) Between New Orleans and Chicago via Birmingham and Indianapolis, and between New Orleans and Detroit via Birmingham, Louisville, Cincinnati, Columbus and Cleveland.

SPECIFY SPERRY

Integrated

New system provides simpler, more pictorial cockpit information

MORE FLIGHT DATA, in clearer visual form, in less space . . . this is a modern cockpit need now answered by Sperry instrument specialists. With the Sperry Integrated Instrument System, three new instruments are incorporated into the basic six now in common use, giving the pilot more of the data he needs—simply, conventionally, pictorially—without increasing the number of instruments on his panel.

The Sperry Integrated Instrument System consists of a more accurate and reliable primary direction instrument, a combined flight director and gyro-horizon, and a pictorial deviation indicator. Manual control of higher performance aircraft—through all phases of VFR and IFR flight plans—can be an orderly, efficient procedure with these panel aids.

NEW THREE IN BASIC SIX

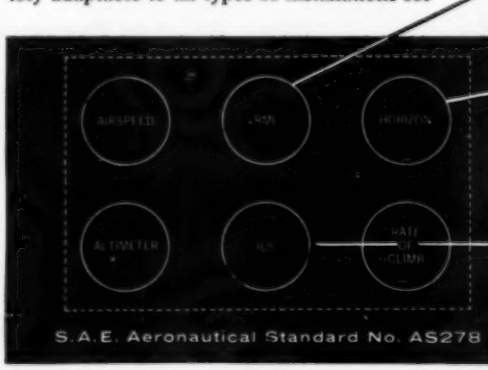
Model C-6 Gyrosyn* Compass uses a master indicator with RMI (Radio Magnetic Indicator) presentation and data transmitters for providing accurate heading information to other equipment. A settable course marker also serves as the heading selector for the flight director. Model C-6A Gyrosyn Compass is also available with integral switch for selecting input to radio pointers.

Model HZ-1 Horizon Flight Director is a pictorial horizon with conventional sensing, effectively combined with the well-known Sperry Zero Reader* Flight Director. The non-tumbling horizon is graduated to ±90° in pitch from level flight and provides pitch and roll attitude information at all times while flying "zero" on the Flight Director. When not in use the Flight Director pointers can be retracted from view.

Model R-1 Pictorial Deviation Indicator displays aircraft position with respect to ground radio facilities. It includes a new pictorial presentation of the TO and FROM zones of VOR, and an omni-bearing selector. On ILS it provides both glide path and localizer deviation.

The System also includes a new lightweight, transistorized computer for more stable coupling to ILS during manual approaches. This Model Z-4 Flight Director Computer is completely free from the effects of cross-winds and varying pitch attitude resulting from changes in speed and loading.

The Integrated Instrument System is flexibly adaptable to all types of installations for present and future aircraft. The Sperry Model A-12-I Gyropilot* includes these new panel instruments and is operated from the same remotely mounted, non-tumbling gyros.



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Pre-SBAC Review of British Aircraft Industry

Ten companies have passed their 40th birthdays and are still run by their founders.

By JAMES HAY STEVENS

FARNBOROUGH—A significant feature of the British aircraft industry this year as the Society of British Aircraft Constructors prepares for its annual display is the number of companies that passed their fortieth birthdays in 1955.

These include Avro, Blackburn, Boulton Paul, Bristol, Fairey, Hawker (originally Sopwith), Handley Page, Short, Vickers, Westland—not to mention Rolls-Royce's half century.

This evidence of the age of the British aircraft industry is more significant than just a sign of maturity. The ultimate control of these senior companies is still in the hands of the pioneers who founded them and after whom most of them are named. These men and many of the other senior assistants are approaching the retiring age and it may well be that the next five years will be critical in the management field, with younger men moving into control.

Competition for the limited market in both civil and military aviation is strong at home and abroad. The lesser companies, or those failing to sell their own designs to the British government, are officially helped by being awarded sub-contracts for the chosen articles.

Space limitations permit only a partial review of the industry, which follows (asterisks indicate members of the Hawker Siddeley Group):

• ***Sir W. G. Armstrong Whitworth Aircraft Ltd.** is in a production trough at the moment because of the ending of its Meteor night fighter, Hunter 2 and Sea Hawk runs. This has resulted in the dismissal of about 2,000 employees, but is no more than a routine switchover between contracts. The company's missile department is going ahead well in its Classified and unmentionable work, mainly for the Royal Navy.

Major event at A.W. this year has been the running of its privately financed Mach 3 wind tunnel at Whitley.

• ***Armstrong Siddeley Motors Ltd.** is in a strong production position, with lines of Sapphire turbojets (Hunter 2, Javelin, Victor, P-1), Mamba and Double Mamba turboprops (Seamew and Gannet), and Viper turbojets (Jindivik target, Jet Provost trainer). Present revealed power of the Sapphire ASSa 7 is 10,200 pst and the engine has a fine reputation for being surge-free and maintaining power to 50,000 ft. plus. The Sapphire is license-built as the Wright J-65 and Dassault in France has licensed the Viper as a dual-power fighter engine. Armstrong Siddeley also makes the Snarler 2,000-lb.-thrust liquid-oxygen rocket and a higher fighter power motor, the Screamer.

• ***A. V. Roe & Co. Ltd.** is principally engaged in getting the Avro Vulcan delta-wing V-bomber into service with the RAF. The first production airplane flew in February and deliveries of the initial service trial batch have been mounting since then. The first RAF squadron should be formed this winter.

Avro also now has a line of Shackleton MR3 ocean reconnaissance planes going for the Royal Air Force and Royal South African Air Force. Tricycle gear and wingtip tanks of this airplane are the main apparent differences from the earlier Shackleton 2 but the internal layout has been completely reworked to improve comfort and efficiency.

• **Boulton Paul Aircraft Ltd.** is one of the smaller airplane companies, although it has been designing planes since the end of World War I. Contracts for the Balliol T2 and the Sea Balliol T21 basic trainers for the RAF and the Royal Navy are now complete. Sub-contract airplane parts are on the floor, but the company's principal activity is quantity production of its high-fidelity power control units for the Valiant, Vulcan and other new RAF airplanes.

• **The Bristol Aeroplane Co. Ltd.** is active in the engine (piston and turbine), airframe (fixed and rotating wing) and missile fields.

Current engine production includes the 3,000 hp Centaurus for the Beverley and the 2,000 hp Hercules for the evergreen Bristol Freighter. The Olympus two-spool turbojet is in production for the Vulcan and the Proteus 755 free-turbine turboprop for the Britannia. The new high thrust/weight ratio Orpheus light fighter (or multi-unit supersonic) turbojet is shaping up well and is already airborne in the Folland Gnat.

Scheduled also for the FIAT G-91 and Breguet Taon NATO light fighters, the Orpheus has U.S. financial sponsorship and series production is certain. Yet to run on the bench is the 5,000 hp constant-power BE-25 turboprop, slated for future Britannias, including the transatlantic LR series.

• **The de Havilland Enterprise** names its airframe, engine and propeller divisions as separate companies.

The Airframe company is facing up to the Comet setback by beefing-up the structure in the Series 4, first of which should fly in 1957, with deliveries of the 20 B.O.A.C. planes starting the next year. Over 150 hours' de-

Folland Gnat light fighter (left) and Midge will be attractions at Farnborough show in England September 6-11.

velopment flying with the externally similar Comet 3 and engine development flying in a Comet 2, plus tank-testing of the new fuselage, is designed to give bug-free entry into service.

Comet 4 with 10,500 pst Rolls-Royce Avon RA 29s is said to offer 500 mph cruise with 16,400 lbs. payload for 2,900-mile stage, or 19,300 lbs. for 2,300 miles, on a gross of 152,500 lbs. The company is also developing the DH 110 all-weather fighter for the Royal Navy and has reached the stage of a third partially-navalized prototype.

The Engine company is continuing to build 140-hp Gipsy Majors, 240/380-hp Gipsy Queens, and has just brought out a direct-injection 200-hp Major for helicopters. Ghost and Goblin turbojet production is tapering off, but continues, with repair contracts. The simple-axial 15,000-pst Gyron is now flight testing in the Short Sperrin and the Spectre rocket motor will shortly be airborne. The Super Sprite ATO rocket pack is in production for RAF V-bombers.

• **The English Electric Co. Ltd.** continues to produce Canberras and to evolve new variants. An interim ground attack version, the B6 with bomb-bay cannon pack and underwing bombs, is now entering service with the RAF in Germany, while deliveries of the B-8 night interdicter with single cockpit have started. The PR 9, with extra span, greater centerplane chord and new Avon is on development flying. This airplane is likely to be used for an attack on the 63,668 feet altitude record (meaning over 65,500 ft.) held by the Olympus Canberra with standard wing.

Two P-1 twin-Sapphire level supersonic fighters are now flying-with more due for delivery soon. For level-speed acceleration through Mach 1 some form of power boost is essential—and a Sapphire Canberra has been flying with an afterburner for two years.

• **The Fairey Aviation Co. Ltd.** has for many years had a close tie-up with the Royal Navy. Present production is the three-seat Gannet anti-submarine carrier airplane, deliveries being from the Hayes and Stockport plants. VTOL activities started five years back with the little FD-1 delta and continued with ramp-launched delta-wing rocket models. Now work is concentrated on rotating wings, the twin-Eland Rotodyne convertiplane and the little jet-drive army ultra-light.

The Rotodyne, due to fly in about a year, is designed for 11,000-lbs. payload, 150-mph cruise and about 250 miles maximum stage length. Vertical take-off and landing use tip combustion supplied by compressors driven from two 3,000-shp Napier Elands—which are already bench running in this form. Cruising propellers are used for traction, lift being shared between autogyrating rotor and stub wing.

• **Folland Aircraft Ltd.**, with its Gnat light fighter and Midge prototype provides the enigma of the S.B.A.C. Display. The Midge flew exceptionally well, gave no trouble, while a canopy accident grounded the Gnat early in its flight trials. The Gnat exists, yet NATO orders the paper Fiat G-91 and India lingers undecided. "Simplificated" to the last rivet, the Gnat could be produced rapidly by Folland or by a licensee (Hindustan Aircraft) using local labor. Folland, currently producing Hunter tail planes, Britannia nacelles and Venom wings, has a high manufacturing reputation.

• ***Gloster Aircraft Co. Ltd.**, has been the subject of a press attack because of delays of entry of the Javelin into RAF Squadron service. It is generally agreed that production is on schedule, but handling, equipment and weapon trials have progressed slowly because of shortage of prototypes—three out of five destroyed.

• **Handley Page Ltd.** shows one of the two entirely new airplanes, the Herald—even so it has been seen before as mock-up and brochure at Farnborough and Paris and is familiar in detail. With four 870 hp Alvis Leonides Majors it will carry 44 passengers and fly from any grass field that a DC-3 can use. The Herald has a high wing, providing passenger attraction and easy loading. The first production Victor bomber, with lowered tail and lengthened nose, may make the Display.

• ***Hawker Aircraft Ltd.** will again show Hunters, for which RAF and O.SP. backlog will keep the plants busy for some years yet. A new variant is the Hunter Operational Trainer with side-by-side seating. There is as yet no visible sign of a "Hunter replacement" from its own stable.

• **Hunting Percival Aircraft Ltd.** has its production floor space at Luton well occupied with Provosts, Princes and Pembrokes. The jet Provost is undergoing service trials. The first Frise low-pressure, hot-jet helicopter, the P-74 with two Napier Oryx gas generators is nearing completion, with flight expected late this year. Without awaiting air tests of the first design, a 10-seat commercial project, the P-105, has been announced—second thoughts differ radically in rotor and gas-flow details from the first design.

• **D. Napier & Son Ltd.** has just about completed preparations for Eland production, deliveries of which will be due in the autumn. The engines are now flight testing in three planes, Valetta, an Elizabethan and a Convair 340. Given anticipated results BEA intends re-engining its Elizabethans in two stages during the '56/'57 and '57/'58 off-peak seasons. By next summer Napier should be offering the Convair conversion at something between $250,000 and $300,000. As an airline power plant the Eland is made in easily-removable units and the target life is: cold end, 2,000 hours; hot end, 1,000 hours.

• **Rolls-Royce Ltd.** is, a part from Alvis, the only U.K. engine manufacturer without airframe associations. Production is well established for both the civil and military markets—with a comfortable number of foreign licenses and technical tie-ups.

Production, at Derby and Hillingdon near Glasgow, is concentrated upon Avon axials and Dart turboprops, as well as Nenes centrifugals and Griffon piston engines. Current production Avons in the RA 14 series are giving 10,000 pst and upward. The Dart 510 is now coming off the line at 1,742 ehp at 14,500 rpm rating. This version has a specific of 0.689 lb/ehp/hr. Development Darts are already running at around 2,000 ehp.

For the future, R-R offers the Conway by-pass, the RB-109 turboprop and the Soar light jet. The Conway has been running since last winter and has been type-tested at 13,000 pst. The by-pass concept is primarily a transport engine because of its 550-mph optimum cruise speed and the 5% net range increase—which means a big payload lift and fuel saving on a year's Atlantic schedules.

• **Scottish Aviation Ltd.** offers the second completely new type in the Twin Pioneer 14-seat bush liner. Ability to operate with an economical payload out of 1,000-foot jungle clearings is what this airplane offers. High-lift flaps and slats, proved on the spot in Malaya, are the design gimmick.

• **Vickers-Armstrongs Ltd.** is productively active in both military and civil fields. Viscount backlog is now catching up, due to deliveries both from Weybridge and Hurn and has steadied at the promised two years on orders. Since June, output has been running at five a month and it is slated to rise to six next year—making 71 airplanes in 1956. This takes account of the introduction into the line of the stretched 800.

Orders placed now, says Vickers, will be cleared by August 1957. Envisaged maximum potential is 12 airplanes a month—ten from Hurn, two from Weybridge—and extra lines will be planned in to keep to two-year delivery period. Vickers thinks orders may continue to stretch deliveries out almost to 1960. • • •

Most Aircraft Firms Show Gains in Sales and Earnings

• Interim reports reveal pronounced cross-currents; six companies record sales decline and eight report lower profits.

By SELIG ALTSCHUL

WHILE THE AIRCRAFT industry, as a group, is recording smart increases in sales and earnings, not all units are participating in this improved showing. This is demonstrated by interim results reported thus far this year by 18 major aircraft builders and as shown in the accompanying exclusive AMERICAN AVIATION compilation.

Interim results in the aircraft industry must always be tempered with important qualifications. A major consideration remains in that the industry is essentially a contracting business and, as such, does not always lend itself to many of the standard financial ratios peculiar to ordinary lines of manufacturing enterprises.

For example, aircraft contracts may extend for 18 months or more. Until these individual contracts are completed, interim sales and earnings reported on such business are, at best, accounting approximations to be tempered with ultimate adjustments. Even then, until renegotiation is completed, there can be no finality to reported earnings.

• Nevertheless, aircraft companies have been forced to follow the pattern of good financial corporate practice in issuing interim reports. More and more aircraft builders now issue quarterly statements with semi-annual reports available for all companies. It is well that these interim reports are published because, despite their surrounding qualifications, they do show significant trends.

For example, six of the eighteen aircraft builders show a decline in sales and eight reveal lower earnings for 1955 interim periods as compared with like periods a year ago. By and large, however, most aircraft companies reveal varying gains in sales for the first six months of 1955 over the corresponding period a year ago, with even sharper increases in reported earnings in most instances.

Northrop's 96% gain in sales and 385% increase in earnings for the first nine months of its 1955 fiscal year is abnormal and the result of special circumstances. This sharp improvement is attributed by the company to the changeover from cost-plus-fixed-fee to fixed-price contracts as well as to lower income taxes.

Republic's 80% boost in sales for the first six months this year is one of the best in the group and reflects, in part, 1955 deliveries of late 1954 production. As a consequence, earnings more than doubled, reaching some $9.6 million for the first half, as compared with almost $4.6 million for the like 1954 period.

Due to relatively lower production schedules for the second half, Republic is unlikely to repeat its performance for the first six months. In any event, the company appears assured to establish 1955 as its best year in point of view of sales and earnings.

• More consistent is the pattern of sales and earnings as revealed by North

MAJOR AIRCRAFT BUILDERS' COMPARATIVE SALES AND EARNINGS

First Six Months 1955 and 1954

($000 omitted)

	Sales		% Increase or (Decrease)	Net Income				
				Amount		% Increase or (Decrease)	Per Common Share	
	1955	1954		1955	1954		1955	1954
Beech(1)	$ 59,496	$ 60,300	(1.3)%	$2,800	$2,357	18.8%	$4.67	$3.93
Bell	107,962	93,208	15.8	3,184	3,420	(6.9)	1.23	1.78
Boeing	370,302	496,861	(25.5)	13,636	17,350	(21.4)	4.19	5.34
Cessna(2)	22,901	20,531	11.5	1,110	837	32.6	1.52	1.14
Chance Vought	59,911	77,667	(22.9)	702	1,293	(45.7)	1.63	2.97
Curtiss-Wright	250,072	234,551	6.6	15,066	7,569	99.0	1.90	0.95
Douglas(4)	435,841	493,893	(11.8)	13,681	19,179	(40.2)	3.71	5.20
Fairchild Engine	78,911	70,844	11.4	2,108	2,228	(5.7)	0.73	0.96
Grumman	115,140	108,317	6.3	5,544	5,026	10.3	2.77	2.51
Lockheed(3)	190,453	215,574	(11.7)	4,596	4,808	(6.8)	1.63	1.79
Martin	126,999	97,205	30.7	5,522	6,842	(19.3)	2.15	3.07
McDonnell(5)	154,589	123,092	25.6	4,556	3,621	25.8	6.33	5.03
North American(1)	580,358	493,596	17.6	23,635	14,525	62.7	6.88	4.23
Northrop(6)	214,937	109,647	96.0	8,999	1,855	385.1	6.05	2.61
Republic	300,595	166,950	80.1	9,612	4,598	111.2	7.18	3.79
Ryan(7)	19,444	23,541	(17.4)	797	1,054	(24.4)	2.09	2.73
Temco	37,327	25,754	44.9	1,403	1,325	5.9	0.84	0.79
United Aircraft	359,110	350,429	2.5	15,303	13,267	15.3	4.54	3.91

NOTES:
(1) *Nine months ended June 30.*
(2) *Six months ended March 31.*
(3) *First quarter only.*
(4) *Six months ended May 31.*
(5) *Years ended June 30.*
(6) *Nine months ended April 30.*
(7) *Six months ended April 30.*

The heart of a good helicopter

A helicopter engine that works without driving shafts and driving gear — that's the Napier Oryx. It's a 750 gas h.p. turbo-gas-generator, designed for helicopters propelled by jet reaction at the rotor blade tips. It weighs less, it's less complex and it's easier to maintain than conventional helicopter power systems. The Oryx is a step forward — and upward — in helicopter propulsion, and an engine of great importance to helicopter operators.

NAPIER **Oryx** turbo gas generator

D. NAPIER AND SON LIMITED, LONDON, W.3, ENGLAND

Partners in Progress with The ENGLISH ELECTRIC COMPANY Ltd..

CRC-02

American's figures for the nine months ended June 30, 1955, as compared with the comparable 1954 period. The company's gain of almost 18% in sales was translated into an increase of almost 63% in earnings. Last reports also reveal new business being booked at a higher clip than current deliveries. For example, in its third quarter, the company reported new business of $305.6 million, while shipments of $223.7 million were made during the period.

Consistency in a rising level of sales and earnings is also the pattern of United Aircraft's interim reports. The company showed but a 2.5% gain in sales for the first six months of 1955 but transformed this into an increase of better than 15% in earnings. Moreover, new business bookings also appear to be outpacing current deliveries. Unfilled orders were indicated at about $1,325 million at June 30, 1955, as compared with $1,125 million a year earlier.

• **Curtiss-Wright** is coming in to its own by chalking up a 6.6% increase in sales for the first six months, translated into a 99% gain in reported earnings. The company's indicated backlog, an estimated $818 million at June 30, 1955, is up sharply from the $662 million shown as of Dec. 31, 1954, and assures volume output for the period immediately ahead.

McDonnell Aircraft is the first company in the group to report for fiscal 1955. Sales of better than $154.5 million for the year were the highest in the company's history and represented a smart 25.6% increase over the previous year. Earnings were up almost the same percentagewise, 25.8%, amounting to some $4.6 million or $6.33 per share, as compared with $3.6 million or $5.03 per share for fiscal 1954.

The trend of rising earnings and indicated favorable outlook was soon translated by McDonnell into a proposed 100% stock dividend and indicated stock dividends to supplement cash disbursements to stockholders.

The McDonnell annual report was significant from another standpoint which appears to have received little attention. The company notes that: "The Renegotiation Board has made a final determination, and the Company has agreed to a refund, net of income taxes, of $693,940 for fiscal year 1951." This has been adjusted by restating previously reported earnings for fiscal 1951.

McDonnell, probably because of the early point established by its fiscal year, was among the first to be confronted with a renegotiation claim in the aircraft industry. This settlement does not appear to be quite as burdensome as was first suspected by industry observers.

As each company's renegotiation status is determined largely on an individual judgment basis, it is not possible to surmise that the McDonnell experience may ultimately apply to the rest of the industry.

As old renegotiation claims are settled, new ones will likely appear. Temco, in its interim 1955 six months' report provides a current case in point. While the company showed a gain of almost 45% in sales for the first half of 1955, the increase in earnings was confined to but less than 6%. A factor in this showing is the proposed Renegotiation Board claim of $170,000 (net) to apply against alleged excess profits in 1952. This proposed claim has been reserved in the 1955 accounts while Temco contests this assessment.

The results, as revealed in the interim aircraft reports thus far this year, indicate that the aircraft industry should easily exceed in 1955 the $8.2 billion in sales reported for 1954. It is self-evident, however, that there will be no uniformity in results for the industry. Disparities in sales and earnings, which began to appear in the post-war period, are becoming even more pronounced as competitive battles for the available business become more intense. • • •

NORTH AMERICAN FJ-3 FURY jets, manned by pilots of Navy Fighter Squadron 173, line up for takeoff from U.S.S. Bennington during first carrier operational cruise. Furies are powered by Wright J65s. After engine warm-up, they taxi to port and starboard catapults, spread wings and are launched.

Boeing Delivers 1st YC-97J Turboprop

First of two Air Force C-97 Stratofreighters modified by Boeing Airplane Co. to serve as test beds for Pratt & Whitney T34 turboprop engines and Curtiss Turbolectric propellers has been delivered at Edwards AFB.

Second YC-97J is also slated for delivery to USAF before the end of this month.

Air Force program for the YC-97Js calls for a 20- to 30-day stay at Edwards for flight testing before release to Military Air Transport Service's turboprop test squadron for flight duty. MATS officials estimated that both planes will be in their hands before October 1.

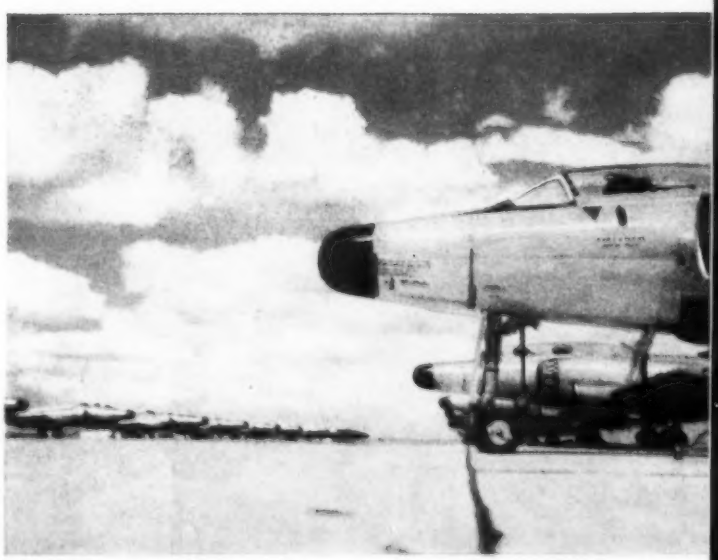
Use of T34s on the C-97 provides close to 63% increase in power, the turboprops being rated at 5,700 hp each compared with 3,500 hp for standard P&W R4360 engines. Turboprop conversion also decreases empty weight of the Stratofreighter by almost 5,000 pounds.

TURBOPROP ENGINES and propellers on converted Boeing C-97 are examined here by test crew before delivery flight to Edwards AFB. Testbed is designated the YC-97J.

AVRO AIRCRAFT: BUILDER OF CONTINENTAL DEFENDERS

FLIGHT LEADER CHECKS HIS LOG

In the deadly serious business of guarding the northern approaches to Canada and the Western Hemisphere against enemy air attack, RCAF pilots and navigators function as a perfectly coordinated team. On that team, too, are the operation's officer, navigation chief, armament officer, radio control officer and ground crew. Backing up this team are the men at Avro Aircraft. For it is their job to design and build planes capable of meeting and repelling attack, if attack should come. This constantly expanding objective is being met by Avro Aircraft's extensive engineering division led by the most outstanding research, design and development engineers in the aeronautical industry. Powered by twin Orendas, no other all-weather interceptor in service today can equal the CF-100 for power and range.



In England, CF-100s are undergoing evaluation tests with the RAF. RCAF squadrons of CF-100s will begin duty with NATO forces in Europe by 1956.

AVRO AIRCRAFT LIMITED MALTON, CANADA

A. V. ROE CANADA LTD.—MEMBER, HAWKER SIDDELEY GROUP.

Circle No. 11 on Reader Service Card.

NEW! HORIZONTAL contour TRANSPORTATION

ANOTHER OTIS FIRST! The Otis TRAV-O-LATOR is a modification of the world famous reversible Otis Escalator—another Otis first that was designed to move people, ***not materials!*** It's as easy to ride as an escalator. Its moving surface is an endless platform of metal escalator treads. It is smooth gliding for safe riding; cleated for safe traction; comb toothed for safe interlocking between treads and for safe stepping from moving treads to comb plates at entrance and exit points. In addition, it has the Otis escalator balustrades and handrails. All, long proven safety features.

There's practically no limit to the length, flexibility, or use of the TRAV-O-LATOR. Ask any of our 295 offices across the United States and Canada for details.

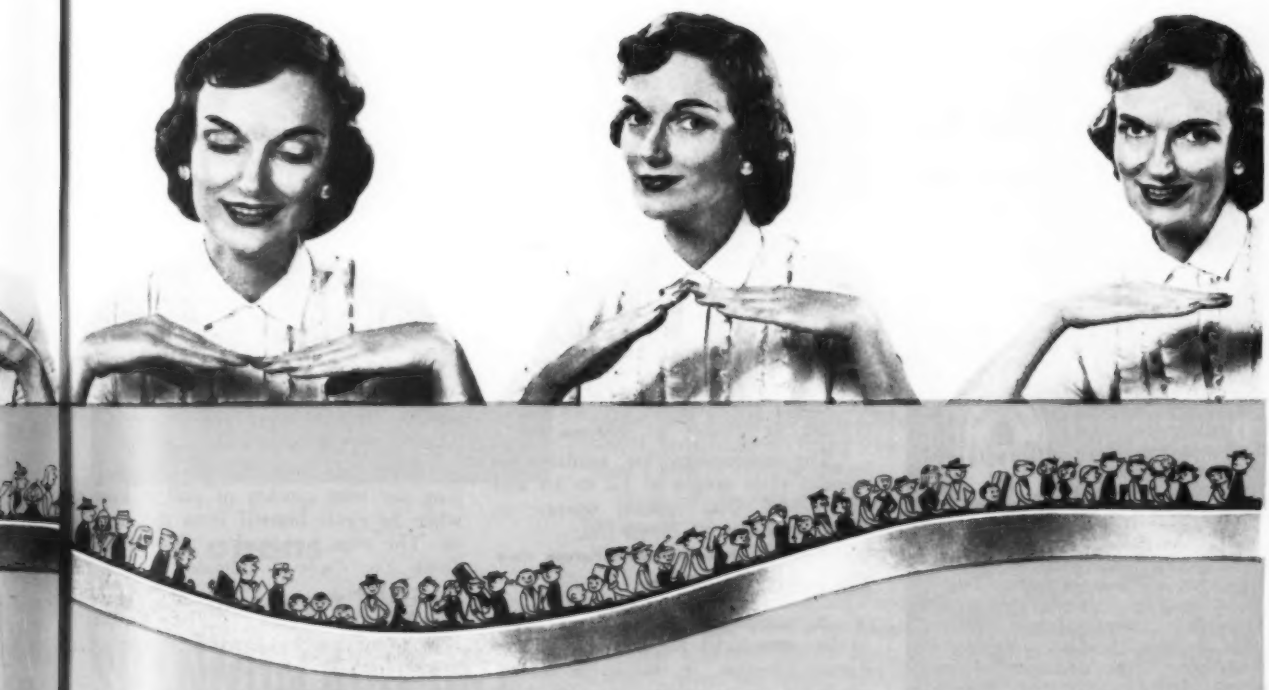
OTIS ELEVATOR COMPANY, 260 11th Avenue, New York 1, N. Y.

*Trade Mark

FIRST SAFE ELEVATOR, 1853 • FIRST ESCALATOR, 1900 • FIRST TRAV-O-LATOR, 1955

ON WITH THE Otis

TRAV-O-LATOR*

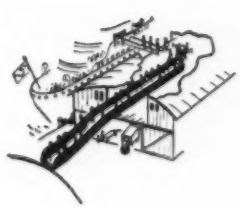


YS BEEN THE BUSINESS OF OTIS

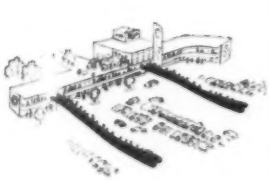
TRAFFIC CROSSINGS

AIRPORTS

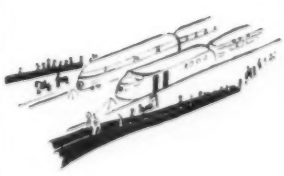
CITY CENTERS



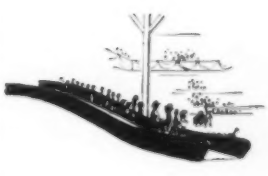
STEAMSHIP PIERS



SHOPPING CENTERS



RAILROAD STATIONS

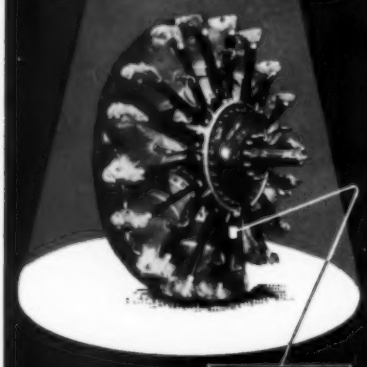


SPORT STADIUMS

SCHOOLS

Circle No. 12 on Reader Service Card.

LUND
R-1340'S
are in the
Spotlight



Don't waste time searching for R-1340's. See Lund Aviation, specialists in special purpose aviation equipment. Wide experience in supplying items for special "tailor-made" requirements has established Lund's reputation as an authority and a specialist in this field.

For instance, Lund-supplied R-1340-40 and -57 direct-drive engines are currently being installed in *factory* new Sikorsky S-55 helicopters; and R-1340-AN2 geared engines in *factory* new DeHavilland Otters. Other Lund furnished R-1340 engine configurations, parts and tools are also being installed in Grumman Mallards, North American AT-6 and SNJ trainers, Noorduyn Norseman, etc.

Lund R-1340's are tops in dependability. They carry the famous Airwork overhaul emblem, your guarantee that they have been remanufactured to the highest standards by a factory authorized agency. All the latest Pratt & Whitney factory and CAA required modifications have been incorporated. They carry a double warranty — Lund's plus Airwork's — and come to you with completely detailed records.

For convenience, dependability and economy, get your next R-1340 from Lund. It will be supplied tailored to your airframe configuration . . . quickly and at a surprisingly low price.

Years of Personal Performance Are The Foundation Of

Lund Aviation, inc.

230 Park Avenue • New York 17, N.Y., U.S.A.

MILLVILLE, NEW JERSEY MONTREAL, CANADA

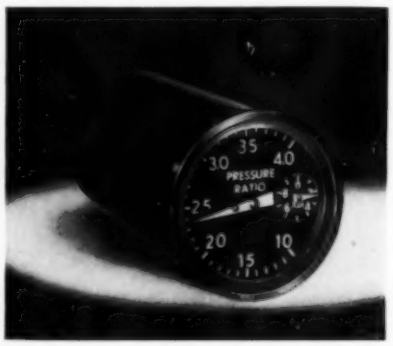
Circle No. 13 on Reader Service Card.

New Products and Processes

PRESSURE INDICATING SYSTEM

Norden-Ketay Corp. has announced a new pressure ratio indicating system for jet aircraft engines. Three classes of transducers and indicators are available.

The transducer is a torque balance mechanism utilizing a symmetrical floating plate.



Overall accuracy, according to the manufacturer, is better than ±0.02 under all conditions for all three classes. Power requirements call for either 115-volt or 28-volt ac systems.

The instruments are available in pressure ratio ranges of 1.2 to 3.4 and 1.0 to 4.0. The systems operate at altitudes from 0 to 75,000 feet.

Circle No. 163 on Reader Service Card.

AIR PRESSURE PUMP

A motor-pump unit, Model RG-10470, introduced by Lear Inc., Lear-Romec Division, is said to be readily adaptable to a process or a machine requiring automatic pressure to 20 psi gauge.

Pump displacement is 0.304 cu. in. jer revolution. Rated capacity is 550 cipm free air delivery at 20 psi discharge pressure, with standard sea level inlet conditions.

Lear-Romec dehydrators containing absorbent desiccant are available as extra equipment.

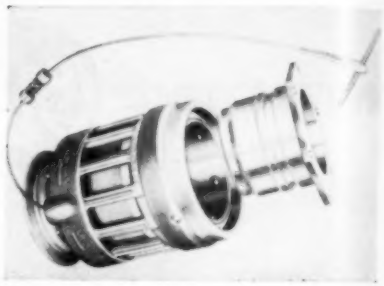
The motor is a 1/6 hp unit at 3,450 rpm, 115 volts, ac, 4 amps., 60 cycles, single phase, continuous duty. It weighs 36.82 lbs.

Circle No. 152 on Reader Service Card.

AIR-START COUPLINGS

Roylyn Inc. has developed what it believes to be the first air-start couplings to meet Air Force requirements for the 3-in. pneumatic starter systems on turboprop and turbojet engines.

AF requirements call for either of two safety devices, a lanyard pressure lock unaffected by gravity or a



device that prevents the flow of air through the coupling when it is disconnected. Roylyn models offer either or both.

The couplings incorporate a butterfly shut-off valve (patent pending) that prevents the flow of air when the coupling is not locked in place. Two methods of disconnect are provided, lanyard and manual.

Circle No. 166 on Reader Service Card.

OXYGEN HOSE

Dayton Rubber Co. has developed a new oxygen hose that carries radio communication wire on the outside to provide greater safety for jet fighter pilots flying at supersonic speeds.

With this hose, the pilot can unplug the wire quickly or pull it loose when he ejects himself from the cockpit. The wire, insulated in plastic, runs down the "screw" outside the new oxygen hose.

According to the manufacturer, the new hose eliminates possible danger of sparks from the wire igniting the oxygen and minimizes the danger of the pilot becoming entangled in the wire in an emergency bail-out.

Circle No. 155 on Reader Service Card.

HYDRAULIC GAP PRESSES

K. R. Wilson, Inc. has anounced a new line of hydraulic gap presses with

adjustable beds, available in 15 and 25-ton models, either of the hand-air-oil type or motor-operated.

The adjustable bed is easily raised

The modern, attractive Hertz counter above, located at the Shannon Airport, Limerick, Ireland, is Hertz' latest addition to its long list of airport rent a car offices. This new office, like other new Hertz airport offices being installed all over the world, is helping to bring you new passenger revenue. And here's how it's being done!

Hertz opens new office at the SHANNON AIRPORT Limerick, Ireland

Hertz originated the Plane-Auto Travel Plan. Because of it, many travelers no longer drive from city to city just to have their car at their destination. Instead, they fly in speed and comfort—rent a Hertz car on arrival. And they're assured of a clean, new Ford Fordomatic or other fine car wherever they go. That's because Hertz serves them at more airports and more cities than any other rent a car system. In fact, there are nearly 900 Hertz offices in over 550 cities throughout the United States and most foreign countries.

To tell your passengers of the Plane-Auto Travel Plan, Hertz spends over $1,000,000 a year for advertisements in national magazines. No other company spends nearly as much to promote the Plan. Neither can any other company offer your passengers 10,700 clean, new cars . . . and more than 30 years' experience in courteous rent a car service.

Hertz also assures you of steady Plane-Auto Travel Plan business because more than 1,500,000 qualified persons now hold Hertz Charge Cards and Courtesy Cards. Hertz also honors Air Travel Cards.

Hertz, already at most major airports everywhere, expands again to bring airlines NEW PASSENGER REVENUE.

How you can help sell the Hertz Plane-Auto Travel Plan

Promote the Hertz Plane-Auto Travel Plan in all your advertising, displays, folders and any other advertising and promotional programs. And best of all: *urge your ticket sellers and reservation clerks to ask your passengers this simple question:* **"May I reserve a Hertz car for you at your destination?"**

For complete information about the Plan, write:

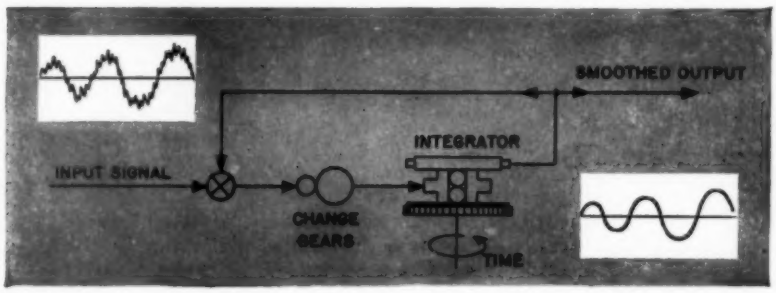
HERTZ *Rent A Car* **SYSTEM**

Department C85, 218 S. Wabash Ave., Chicago 4, Ill., Phone: WEbster 9-5165

SINCE 1915 LEADERS IN AUTOMATIC CONTROL

Smoothing Signal Noise with the DBR* Integrator

Confronted with the well-known problem of random fluctuations called "noise," Ford engineers have employed the earliest and best-known Ford component – the disk integrator. Used in Ford analogue computers, the disk integrator smoothes random fluctuations due to extraneous influences and obtains an average of the received signal. Thus, a device originally designed by Ford for integration is successfully used as a mechanical counterpart of the RC Filter.



The Ford circuit operates on the premise that the older the data the less important it is. Therefore, data smoothed must be weighted in proportion to its age, so that the weight assigned to it decreases exponentially with time. The output of the circuit then represents the summation of this weighted data and tends to ignore random noises of short time duration.

As shown in the drawing, the incoming signal (with noise superimposed) is the input to the differential. As long as the integrator output (the roller) rotates at the *same rate* as the incoming signal, the differential output (error signal) is stationary and the integrator carriage remains stationary. But any change in the incoming signal produces changes in the *error signal* which tends to displace the integrator carriage and thus restore the system to equilibrium.

This reaction, however, is not instantaneous. It occurs after a certain time-lag which may be adjusted by the gear ratio. If the signal is of brief, random nature, the time-lag of the integrator will prevent its acting on the system. On the other hand, a permanent change in the signal will displace the carriage and change the output of the system.

This use of the Ford disk integrator as a noise smoother exemplifies the flexibility and adaptability of Ford components and ideas.

*Disk, Balls and Roller Integrator

68

FORD INSTRUMENT COMPANY
DIVISION OF SPERRY RAND CORPORATION
31-10 Thomson Avenue, Long Island City 1, N. Y.

ENGINEERS
of unusual abilities can find a future at FORD INSTRUMENT COMPANY. Write for information.

Circle No. 14 on Reader Service Card.

or lowered to handle large or small pressing jobs, according to the manufacturer.

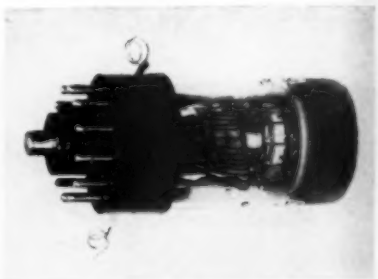
In the hand-air-oil models, there is an air-oil internal spring return cylinder. One stroke of the hand pump handle builds up tons of pressure. Fifty lbs. of air pressure produces a ram travel of 8 in. per sec. down to the work.

Circle No. 143 on Reader Service Card.

COUNTING TUBE

A new model of the "Dekatron" cold cathode counting tube is being made by Atomic Instrument Co. Readability of the 12-cathode Type GS12D tube is improved by provision of a smooth-end tube face.

Designed to permit counting in the



scale of 12 involving units of dozens, inches, gross, etc., the counting rate is 0 to 4,000 pulses per second. Bulb diameter is 1.3 in. Length is 3.49 in. Total anode current is 0.35 ma. with a minimum supply voltage of 350. A 13-pin plug-in base is used, plus two extra flying leads.

Circle No. 144 on Reader Service Card.

MAGNETIC SERVO AMPLIFIER

Designed specifically for instrument type air-borne servo systems, the Specialties, Inc. magnetic amplifier Type T1616JC operates directly from a synchro control transformer or potentiometer, without preamplifier or demodulator.

The unit uses a three-stage fast response half-wave bridge circuit that the manufacturer says is capable of 20-cycle bandwidth when driving a BuOrd Servo Motor Mk 7 in a closed

loop system. The hermetically sealed amplifier uses six watts from a 115-volt, 400-cycle supply.

Circle No. 145 on Reader Service Card.

OPTICAL GRINDING MACHINE

A new type of high speed optical grinding machine that is said to accomplish in seven minutes work that formerly required as much as 33 man-hours has been developed by engineers at Northrop Aircraft, Inc.

Because of its versatility in the precision grinding of any spherical, aspherical, rhomboid, polyhedron, pris-

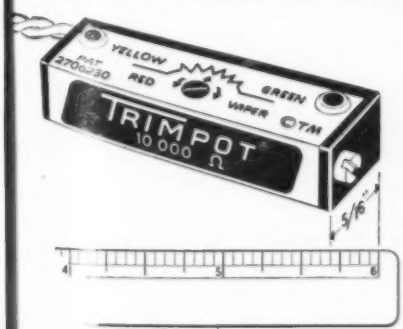
matic or other form which can refract light, the machine has been called a "refractoform."

The machine was built by Keystone Engineering Co. to Northrop specifications. Keystone has been licensed by Northrop to manufacture it. Co-inventors are Robert P. Johnson and Warren Ashenfelder of the Northrop-Hawthorne engineering division and Nathan Wilcox, supervisor of the Northrop-Pasadena optical laboratory.

Circle No. 146 on Reader Service Card.

TRIMMING POTENTIOMETER

Bourns Laboratories' new Model 160 TRIMpot is a sub-miniature trimming potentiometer designed to meet the demands of aircraft and missile

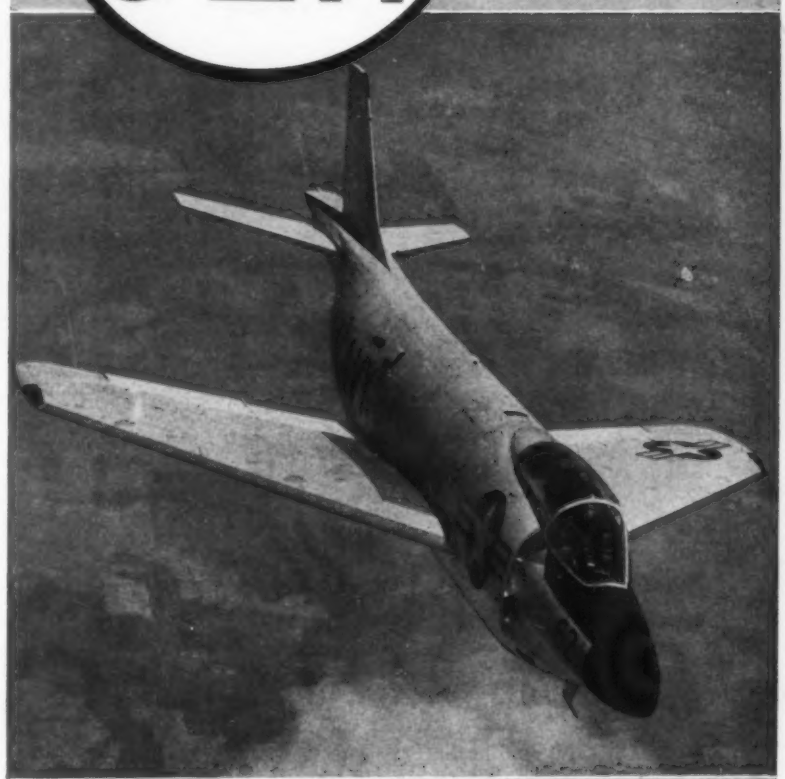


manufacturers for instruments with exceptionally high temperature and power rating characteristics.

Measuring only ¼ in. x 5/16 in. x 1¼ ins. the Model 160 has an operating temperature range of —65° F to + 350° F.

Circle No. 150 on Reader Service Card.

GLA ignition

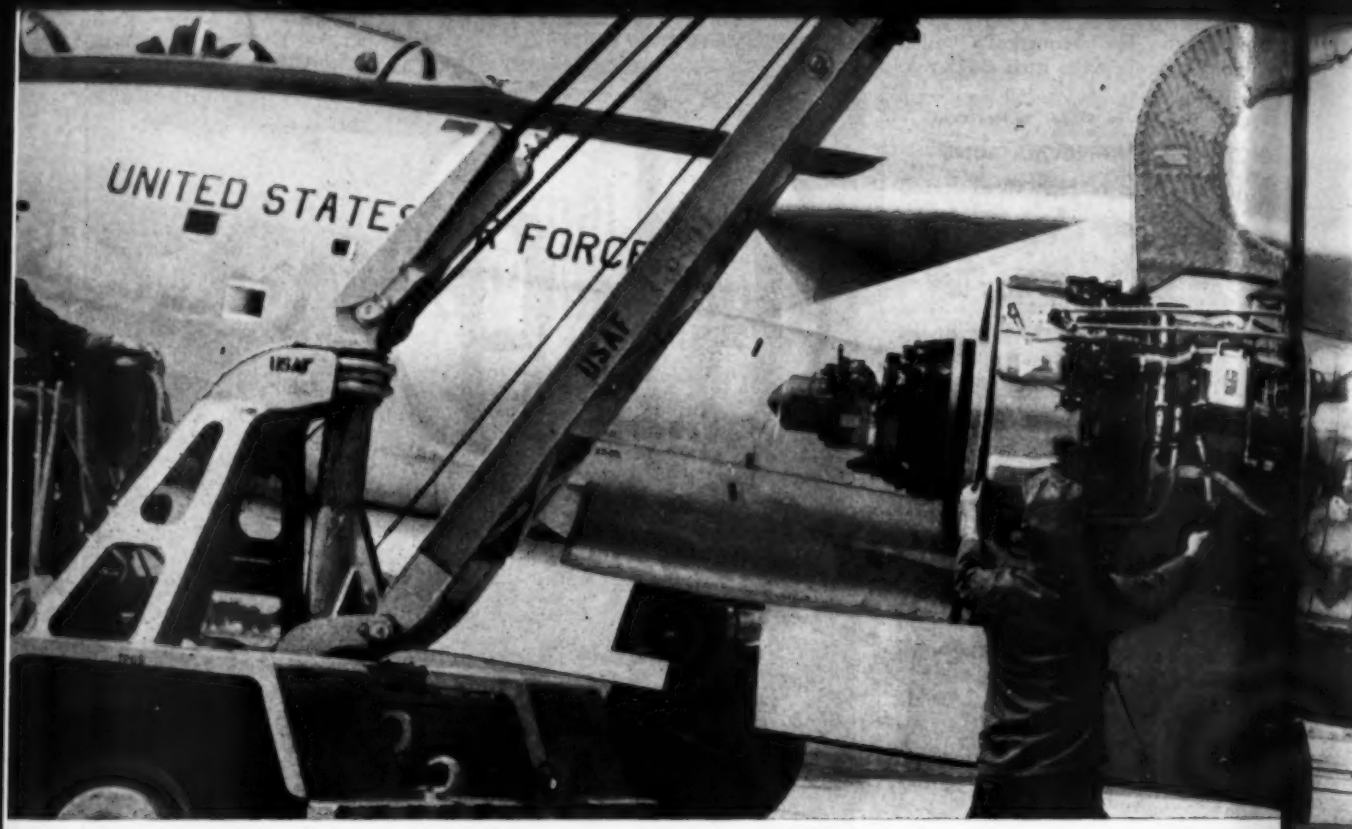


on the McDonnell F3H DEMON

GENERAL LABORATORY ASSOCIATES, INC.
Norwich GLA New York

AIRCRAFT IGNITION AND ELECTRONIC EQUIPMENT

Circle No. 15 on Reader Service Card.



At Pinecastle AFB, all six J47's on B-47 pass

1000 HOURS WITHOUT OVERHAUL

Estimated 490,000 miles flown by each G-E engine installed on Boeing Stratojet No. 51-2076, part of SAC's 19th Bomb Wing

Setting the pace for the growing durability of American turbojets, all six General Electric J47-GE-23's installed on a SAC B-47B recently passed 1000 hours without overhaul at Pinecastle AFB, Orlando, Florida.

These rugged J47's, operational since November of 1952, went through 600 hour inspection over a year ago with only minor parts replacement. At last report, all engines had approximately 1010 hours. Since each hour was flown at an estimated airspeed of about 490 mph, total flight distance of the B-47B has been more than 20 times around the world.

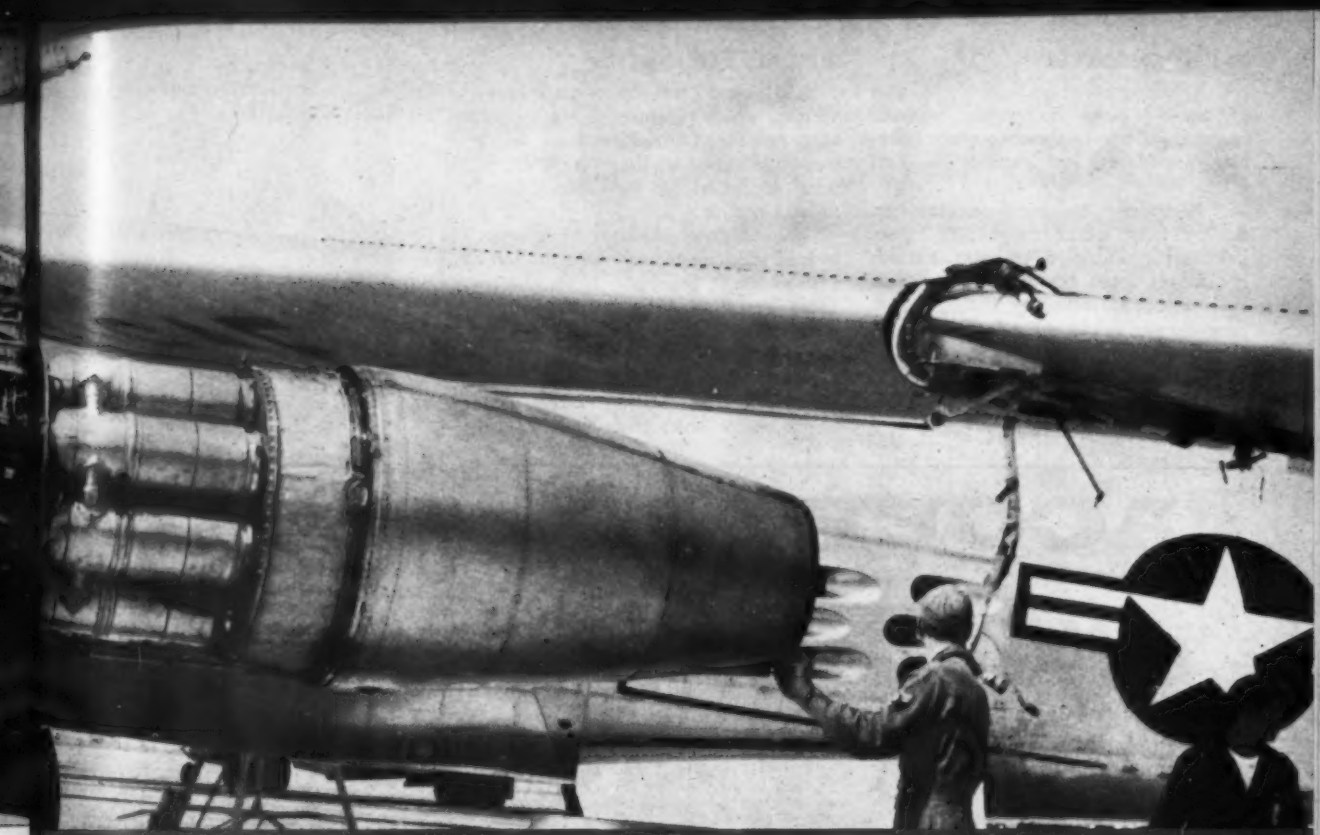
Used today in the North American F-86 and B-45 as well as the B-47, hundreds of J47's are nearing the 1000 hour mark. As a result of their outstanding performance, the Air Force has saved more than $100 million through reduction in the total number of engines required. Since 1950, improved production methods in G-E jet plants have saved another $50 million.

The J47 *typifies* G.E.'s key role in U.S. air power. Right now, operating experience from this turbojet is paying off on still newer engines in G-E test cells and on the drawing boards. 232-1

Progress Is Our Most Important Product

GENERAL ELECTRIC

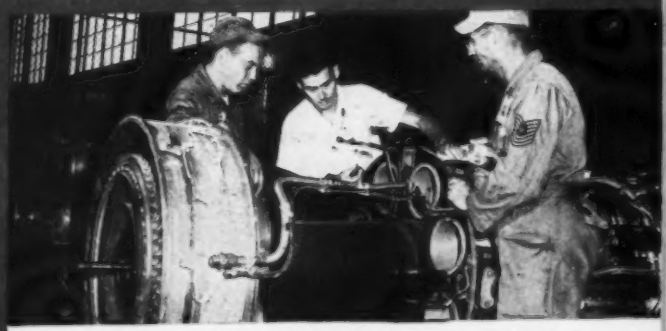
Circle No. 16 on Reader Service Card.



STRATOJET #51-2076 was built at Boeing's Wichita, Kansas, factory. The aircraft has been flying training missions for over 30 months, including the first non-stop transatlantic combat readiness mission undertaken by a SAC B-47 Wing.

G-E TECH REPS who worked with SAC maintenance crews on the 1000 hr. B-47 are shown with the 19th Bomb Wing's Commanding Officer. From left to right, Supervisor Bill Wallace; Col. V. M. Cloyd, Jr.; Walt Duggan.

OVER 1000 B-47's at U.S. Air Force bases throughout the world, are now operational with SAC. In the past 7 years, G.E. has supplied four different engine models—the latest 50% more powerful than ship's original jets.



SAC's LOW J47 ENGINE CHANGE RATE stems largely from close teamwork of USAF maintenance crews and G-E field service engineers. This teamwork has helped to raise J47 allowable operating time between overhauls to 1200 hours.

PAINT 'DISSOLVER'

R.P.O., a product said to be able to remove paint completely without harmful effect to basic surfaces, has been announced by Creative Chemical Co.

According to the manufacturer, R.P.O. (the letters stand for "rinses paint off") will dissolve paint, varnish or lacquer from any surface to which it is applied, including metal, wood, concrete and brick.

The dissolver can be brushed, poured or sprayed on the surface from which the paint is to be removed.

Circle No. 162 on Reader Service Card.

'VISUAL' TACHOMETER

A "visual" tachometer trade-named Visutac, which measures rotary or vibratory speeds of machinery or objects from a distance of three to 50 ft., has been developed by the Boulin Instrument Corp.

The Visutac operates by a spring-wound mechanism that stops motion by a stroboscopic principle. It weighs only 11 oz. and is made in two basic ranges: 500 to 8,000 and 1,000 to 16,000 rpm-vpm.

Applications include measurement of the speed of rotating objects having no accessible shaft ends such as drills, mixers and governors. It is also used for such objects as fans, blowers, pumps, propellers and turbines. The tachometer

makes it possible to determine the optimum safe speed of the equipment for efficient performance.

Circle No. 156 on Reader Service Card.

DRILL CONVERTER

A new device called "Stutter-Chuck" that will convert almost any type of electric drill to an impact wrench has been introduced by Hewitt & Co.

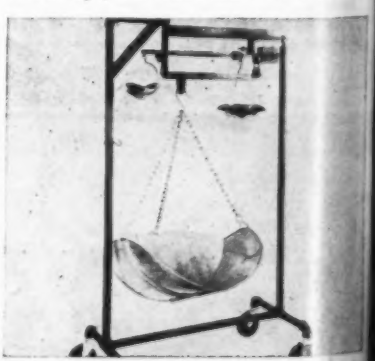
When attached to a portable electric drill or a drill press, the device tightens bolts and nuts, wood screws, lag screws, sheet metal screws, etc. by means of rotary impact.

Cylindrical in shape, "Stutter-Chuck" is 3¾ in. long and $2\frac{5}{16}$ in. in diameter. It weighs 2 lbs. Four models are available, with socket drive sizes ranging from ½ to ⅜ sq. in. and input shaft size from $\frac{5}{16}$ to ¼ sq. in.

Circle No. 153 on Reader Service Card.

PORTABLE COUNTING SCALE

A portable counting scale that has been designed especially to fit between narrow stock bin aisles is being produced by John Chatillon & Sons.



The scale measures 32" x 38" x 64" and has a capacity of 150 lbs. Its ratios are 9:1 and 99:1. Scales with larger capacities and ratios of 10:1 or 100:1 are available.

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Enlist to fly in the U. S. Air Force
"... the future is measured in light-years"

People

MANUFACTURING

Leslie E. Neville appointed director of public relations and advertising for American Bosch Arma Corp.; **V. Charles Schorlemmer** named adminis. vice president.

Neville

Schorlemmer

R.Adm. Lloyd Harrison (USN, ret.) joined McDonnell Aircraft Corp. as vice president-procurement.

R. P. Brush and **Benton M. Garlow**, veteran test pilots for Douglas Aircraft co., assigned to international sales and domestic sales offices, respectively.

Gordon Dean elected senior vice president-nuclear energy, of General Dynamics Corp.

D. W. Berry appointed asst. chief engineer for Westinghouse Electric Corp's. aviation gas turbine div., Kansas City, Mo.

Dr. Milton U. Clauser appointed director of the Aeronautics Research Laboratory, a new division of Ramo-Woolridge Corp.; **Dr. Louis G. Dunn** appointed director of the Guided Missile Research Div.

Charles Jackman named manager of Cessna Aircraft Co.'s export department.

Karl Baur, former chief test pilot for Messerschmitt Aircraft Co., joined the production department at Chance Vought Aircraft, Inc., Dallas.

J. L. Thorne appointed sales manager of The Fairey Aviation Co., London.

Earle A. Ryder, consulting engineer, retired after 30 years with Pratt & Whitney Aircraft.

James E. Lockhart, Jr., Paul A. Kennedy, and **Al Harting** promoted to newly created positions as vice presidents of Southwest Airmotive.

Philip C. Krause appointed chief of aerodynamics of the Kellett Aircraft Corp.

Dr. Henry S. Sack, professor of engineering physics, appointed Cornell Aeronautical Laboratory professor.

R.Adm. Robert S. Hatcher (ret.) appointed director of Guggenheim School of Aeronautics at the New York University College of Engineering.

Joseph E. Lowes, Jr., named director of public relations for Niles-Bement-Pond Co.

Walter D. Peck named export manager for Piasecki Helicopter Corp.

S. W. Beekman appointed manager of mfg. for jet engine department of General Electric Co.'s aircraft gas turbine div.

Franklin H. Donnell appointed vice president-finance of the Electrodata Corp.

Maj. Gen. Victor E. Bertrandias (USAF, ret.), vice president of Hammond Mfg. Co., recalled to active duty to undertake a special assignment in Europe.

Lt. Gen. William E. Kepner (USAF, ret.) resigned as exec. vice president of Bell Aircraft Corp. but remains as advisor and consultant on military affairs.

Reagan C. Stunkel resigned as vice president of electronics div. of Hydro-Aire, Inc. to establish his own electronics Company in Los Angeles.

Harold H. Winton and **Boone T. Guyton** appointed sales managers of the precision components div. and the instrument and systems div., respectively, of Norden-Ketay Corp.

George A. Seaver made vice president and gen mgr. of Marman Products Co. Inc., subsidiary of Aeroquip Corp.

Edwin C. Bintz appointed vice president in charge of production, Abrams Instrument Corp.

Howard L. Foote named staff asst. to vice president-engineering, Stromberg-Carlson, a division of General Dynamics Corp.; **William F. Hafstrom** named asst. to vice president-government contracts.

AIRLINES

Jack K. Svitzer appointed director of sales for Allegheny Airlines.

Evans

Robert M. Evans made passenger service mgr. for Latin American Div., Pan American World Airways, headquarters Miami; **Charles B. Boaz** is Latin American Div. ground operations representative in New York; **Capt. Frank M. Briggs** is division chief check pilot.

Charles L. Strickler appointed asst. to vice president, American Airlines' Washington office.

Jitsuro Kobayashi made asst. to gen. mgr. of sales for Japan Air Lines.

Thomas J. Trainor promoted to personnel assistant, Mohawk Airlines.

John M. Hughes appointed director of military operations of Riddle Airlines.

Richard C. Turner named asst. to manager of regional affairs, United Air Lines, Washington, D. C.

Sidney L. Shannon elected senior vice president of Eastern Air Lines; **George A. Smith** second vice president and exec. asst. to Shannon.

Clint G. Swearea of Delta-C&S Air Lines re-elected president of the Air Transport Association of Cuba for the fourth successive year. **Douglas J. Ingell** jointed the public relations staff of ATA.

HONORED

Ralph S. Damon, president of Trans World Airlines, awarded the American Society of Mechanical Engineers' Spirit of St. Louis Medal "for meritorious service in the field of aeronautics."

Alice H. Huntley, secretary to J. H. Kindelberger, chairman of North American Aviation, named "National Secretary of the Year" at the annual convention of the National Secretaries Assn.

Dan J. Haughton, vice president of Lockheed Aircraft Corp. and gen. mgr. of the Georgia div., received a special citation from the Cobb County Chamber of Commerce for "distinguished and valuable service" to the aircraft industry and his personal "outstanding contributions to Georgia and Cobb County."

GOVERNMENT-MILITARY

Rod Kreger appointed congressional liaison officer of the Civil Aeronautics Board.

Maj. Gen. Christian F. Schilt, U. S. Marine Corps, promoted to lt. gen. and installed as asst. commandant for air at headquarters in Washington.

R.Adm. Edmund B. Taylor assigned as chief of information, Dept. of the Navy, replacing **William G. Beecher, Jr.**

Reuben B. Robertson, Jr., made deputy secretary of defense, succeeding **Robert B. Anderson.**

Maj. Gen. Walter R. Agree, USAF, named head of Civil Air Patrol, replacing **Maj. Gen. Lucas V. Beau,** retiring.

Col. Marion J. Akers, chief of staff of Air Force Flight Test Center, Edwards AFB, Calif., transferred to Rome, Italy, as chief of Air Force section of Military Assistance Group.

Alfred S. Koch, CAA director of aviation safety, retired after 25 years in CAA.

****T. E. Springer,** Douglas Aircraft Co. Vice President and gen. mgr., El Segundo Div., El Segundo, Calif. (35 yrs.)

***Charles Parrish,** Parks College of Aeronautical Technology. Flight instructor, E. St. Louis, Ill. (32 yrs.)

***Gene Kropf,** Parks College of Aeronautical Technology. Dean, E. St. Louis, Ill. (30 yrs.)

David E. Postle, Mohawk Airlines. Director of research, Ithaca, N. Y. (29 yrs.)

Igor A. Sikorsky, Sikorsky Aircraft Div., United Aircraft Corp. Chief engineer, Bridgeport, Conn.

Walter G. Winkler, Douglas Aircraft Co. Service mgr. Santa Monica Div., Santa Monica, Calif.

R. C. McNair, American Airlines. Supervisor-inspection, Tulsa, Okla.

R. A. Miller, American Airlines. Manager-power plant overhaul, Tulsa, Okla.

R. J. Preiss, American Airlines. Foreman-overhaul, Tulsa, Okla.

John McCartney, Pratt & Whitney Aircraft. Production engineering, E. Hartford, Conn.

Samuel Granger, Pratt & Whitney Aircraft. Turret lathe operator, E. Hartford, Conn.

John Hannan, Pratt & Whitney Aircraft. Foreman, E. Hartford, Conn.

Frank Blaney, Pratt & Whitney Aircraft. Toolmaker, E. Hartford, Conn.

Andrew Danyluk, Pratt & Whitney Aircraft. Drill press operator, E. Hartford, Conn.

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- Fully automatic Fault Alarm, Remote Control and Changeover to Stand-by units ensure complete dependability.
- Test equipment "built-in."
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Flight demonstrations of Pye I.L.S. will be given at Hatfield by courtesy of the De Havilland Aircraft Co. Ltd., during this year's Society of British Aircraft Constructors Exhibition.

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Maintenance Bulletin Board

AMERICAN AIRLINES' asst. v.p. M. G. Beard "flies" mockup of Lockheed Electra cockpit, first to have SAE standard layout.

Electra to Feature SAE Standard Cockpit

Lockheed Aircraft Corp.'s new Electra turboprop transport now on order by American Airlines will feature aviation's first standardized cockpit, company officials have announced.

The new layout, established after five years of study by members of the Society of Automotive Engineers, calls for a basic instrument and control arrangement that would eventually make cockpits of all future aircraft "look alike."

Several of the features made standard by SAE, such as instrument panel layout, were later adopted as requirements in Civil Air Regulations for all future transport models. Aim of the standardization is to reduce expensive transitional training from one aircraft to another, improve safety through simplification and increase overall crew efficiency.

In addition to the SAE standard features, Lockheed says the Electra cockpit will have increased cockpit visibility, more elbow room for pilots and better crew seat positioning control.

Following a recent inspection of the Electra cockpit mockup at Burbank, American's asst. v. p.-equipment development M. G. Beard said he feels the standard cockpit design will help speed rapid integration of new planes into the airline's system.

Beard was also a member of the SAE group that set the new cockpit standards.

Circle No. 18 on Reader Service Card.

Aluminum Chips Cut Lockheed Die Cost

Lockheed Aircraft Corp. expects it will save approximately $100,000 in die manufacture this year by using melted-down aluminum chips instead of zinc alloy Kirksite as the foundation for large dies.

The chips come from the machining of integrally-stiffened aircraft structure. Lockheed used to sell these shavings as scrap.

G. A. Fitzpatrick, asst. general manager of the California division, says bulk metal involved is less because aluminum is 66% lighter than Kirksite, but costs only 17% more per pound. Less metal is required because stretch die castings of aluminum need be cored out to only a two-inch wall thickness instead of the four-inch minimum for Kirksite.

Lockheed's die shop has produced 56 aluminum castings this year. Their total weight came to 40,190 pounds. It would have required 224,130 pounds of Kirksite to produce the same tools.

Aluminum cost was $5,224 as compared to $35,860 which Kirksite would have cost. Better adhesion when used with epoxy plastic facing is another advantage of using aluminum as a die backing, Lockheed says.

Air Radio Maintenance Expands Facilities

Air Radio Maintenance, located at New York's LaGuardia Airport Marine Terminal, has extended its electronic test installation to include complete equipment for inspection, test and calibration of Collins Integrated Flight System.

New service is being offered to airline and corporate aircraft operators now introducing the IFS into operation.

ARM facilities include a complete set of laboratory engineered test consoles for troubleshooting system operation. The company claims to be the first CAA repair station of its type to buy the test devices.

Training for the new service was conducted by Collins Radio Co. at its Cedar Rapids, Ia., plant.

UAL Gets SELCAL System

The Motorola SELCAL communications system of selectively calling specific aircraft is being installed fleet-wide by United Air Lines and in the Latin American divisions of Pan American World Airways.

CURTISS-WRIGHT TURBOLECTRIC PROPELLERS

enable LOCKHEED C-130A HERCULES to fly "High and Fast or Low and Slow"

The Lockheed C-130A Hercules – high speed, long range aerial freighter in quantity production for the Air Force – meets advanced requirements for air mobility of personnel, cargo and equipment. Its three-bladed Curtiss-Wright Turbolectric Propellers provide the most efficient means of converting engine power into useful thrust... facilitate low as well as high altitude operation, at both low and high speeds.

The Lockheed Hercules is one of an impressive list of turboprop-powered aircraft using Turbolectrics. These propellers, with one-piece extruded, hollow steel blades, feature full synchronization... full feathering by either manual or automatic means... fast reversing... single-lever power control.

Turbolectrics have been selected for many advanced long-range aircraft types, including the Douglas YC-124B and Boeing YC-97J transports, and the Boeing XB-47D bomber... also for such turboprop types as the Convair XFY-1 and Lockheed XFV-1 vertical take-off fighters... and for experimental aircraft such as the McDonnell XF-88B and the Republic XF-84H turboprop fighters.

Turbolectrics are specified for the major U. S. turboprop engines, which include the T-38, T-49, T-34, T-56 and T-40.

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West Coast Talk . . . By Fred S. Hunter

- **Long-range interceptor competition long-range project.**
- **Northrop believed to have edge on rivals.**

AWARD of Phase 1 (mockup) development contracts in the long-range interceptor competition to three companies, Lockheed, North American and Northrop, could lead to a second competition between two survivors for Phase 2 prototypes before the final winner picks off the production order—if any. It's happened before. It also would give the Air Defense Command more time to evaluate its overall interceptor equipment needs, including aircraft and missiles.

Hunter

It's been a year since the original long-range interceptor proposals were submitted. For twin-engine planes in the 60,000/70,000-pound class, they didn't come out exactly as ADC had envisioned. ADC held up the award while it took a second reading on the speed, altitude and range requirements with which the designers were struggling. It even considered revamping the four-engine Convair XB-58 supersonic bomber to come up with an interceptor with a better speed-altitude-range adjustment.

Northrop also submitted a four-engine design as an alternate to its twin-engine delta Scorpion. Northrop, incidentally, is generally considered to have an edge on its rivals in this one. This is Ed Schmued's first big effort since taking charge of Northrop's engineering, and the Schmued history of design accomplishment is pretty impressive. Northrop also is conceded to have put more engineering time on the particular subject of long-range interceptors than any other company.

• •

North American Aviation's $5,000,000 tri-sonic wind tunnel is scheduled for completion in March . . . United Airlines' maintenance base at San Francisco has expanded to approximately 3,000 productive workers, an increase of about 650 since the first of the year . . . AiResearch runs an 18-ton diesel truck nightly between its busy Los Angeles and Phoenix plants . . . Baumann Aircraft is changing the nacelle configuration of the B-290 to reduce drag and improve engine cooling . . . Marquardt is rated a good chance to catch on the Boeing 707 with its reverse thrust device . . . Hughes Aircraft occupies 21 different buildings at the Airport Site near the Los Angeles International Airport in addition to its big plants at Culver City and Tucson.

• •

Lockheed expects to have preliminary design of the Model 188 turboprop Electra finalized by September 30. Production schedule calls for 100 aircraft the first year, starting out at five a month, then seven, 10 and 11. First plane is due for delivery to American Airlines in August, 1958.

• •

Don't dare utter a word against Flying Tiger pilots to freight salesman Al Pickett. Al was deadheading back to Burbank on a flight out of Newark when an earthquake hit him in the downstairs section. Capt. Jack Morris promptly diagnosed the Pickett misery as an acute attack of appendicitis and declared a medical emergency landing at Buffalo. Al was toted off to a hospital and an hour later his appendix was out. Tom Fydell, CAA inspector at Burbank, was riding the trip and is still shaking his head over Pilot Morris's extracurricular talents.

• •

About 95% of the 293,000 acres occupied by the Air Force Flight Test Center at Edwards is covered with sage brush, leaving about 5% for facilities . . . CAA type certification board vetoed Hiller Helicopter's proposal to evaluate the HJ-1 ramjet in combined fashion as a single and as a multi-engine helicopter . . . A dozen Los Angeles subcontractors report loss of contracts due to the Air Force's dispersal policy, but decline to let themselves be identified because of fear of reprisal . . . Bill Bridgeman's book, *The Lonely Sky*, should be good for $100,000 or more from the movies for the Douglas test pilot and his writer.

THE Beaver L 20
The airborne "½-ton truck" of the U.S. Army
Operating from a 900 foot strip, the L20 in its ambulance role, will carry a pilot, attendant, 2 litter casualties and 2 walking wounded.
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International Aviation

By Anthony Vandyk

Anybody who doubts that transatlantic air transport is big business should visit the observation deck at Idlewild one Saturday. Under current schedules no less than 32 passenger aircraft take off for Europe on that day, with over half of them leaving in the two and one-half hours between 4:30 and 7 p. m.

• •

The procession of Europe-bound transports gets under way at 10 a. m. when a TWA Constellation takes off, followed by another at 11, a third at 12 and a fourth at 1 p. m. There are three other 1 p. m. departures: a KLM Super Constellation, a Loftleidir DC-4 and a PAA DC-6B. At 2 p. m. a Super Connie in BOAC colors takes off, followed half an hour later by a SABENA DC-6B. At 3 there is a PAA DC-7B departure. Then come the 3:25 SAS DC-6B and the 3:30 KLM Constellation flights.

• •

• The busiest period of departures for Europe starts at 4 with three takeoffs: an Air France Connie, a PAA Stratocruiser and a TWA Connie. At 4:30 a PAA DC-6B leaves, followed ten minutes later by an SAS DC-6B. At 5 there are five scheduled departures with representatives of all the principal transatlantic aircraft types: an Air France Super Connie, A BOAC Stratocruiser, a PAA DC-7B, a Swissair DC-6B and a TWA Connie.

• •

A KLM Super Connie takes off at 5:45, followed 15 minutes later by three other aircraft: a BOAC Stratocruiser, PAA Stratocruiser and an SAS DC-6B. The procession of Europe-bound departures ends at 7 with no less than six aircraft scheduled to take off at the same time: an Air France Super Connie, a BOAC Stratocruiser, a LAI DC-6, a Lufthansa Super Connie, a PAA DC-6B and a PAA DC-7B.

• •

Thus within nine hours 32 aircraft accommodating upward of 2,000 passengers leave Idlewild for Europe: eight from PAA; six from TWA; four from BOAC; three each from Air France, KLM and SAS; and one each from Loftleidir, Lufthansa SABENA and Swissair. These figures do not include flights that leave from North American points other than New York (Los Angeles, Chicago and Montreal, for example), all cargo aircraft and transatlantic services to non-European points.

French Coccinelle 'People's Airplane'

Aimed at making private flying a possibility for the man in the street, the SIPA 1000 Coccinelle (photo above) is currently undergoing intensive service tests. The French government is expected to pay 60% of the aircraft's $4,000 price in the form of subsidy, thus making the Coccinelle truly a "people's airplane." Several pre-production models are under construction with initial deliveries of production planes scheduled to start in April.

Powered by a Continental engine (either a 65-hp or 90-hp unit) the Coccinelle is a sturdy but simple aircraft grossing about 1,200 pounds and having a range of up to 440 miles. The fuselage comprises steel tubes while the wing is made up of completely uniform half-ribs riveted to a simple sheet-metal main spar with a sheet-metal leading edge forming a torsion box. Both the wing and fuselage are fabric-covered.

The entire design has been planned for easy and cheap production. SIPA aims to build an aircraft a day by next summer, with production rising to four planes daily if orders justify such an expansion. Not only is the Coccinelle cheap to buy but it is also inexpensive to operate. The brakes, for example, are the same as those used on the 4-cv Renault "people's car" and thus cost a fraction of the price of normal aircraft brakes. The SIPA company is located at 1 Place Eugene-Sue, Suresnes, Seine, France.

Transport Briefs

Japan Air Lines has formally cancelled its order for two Comet 2s . . . Discussions are taking place for the inauguration of services by **LAI** and **JAT** linking Italy with Yugoslavia; proposed routes are Rome-Dubrovnik-Belgrade and Milan-Venice-Belgrade . . . **TAP** Portuguese flag carrier, has taken delivery of two of its three L-1049G Super Constellations; it will use the new equipment on its route to Southern Africa and to inaugurate a new service to Brazil . . . **KLM Royal Dutch Airlines** has acquired a financial interest in **Air Ceylon International,** which is to resume long-haul international operations; previously **ACI,** with the backing of **Australian National Airways,** had operated such services but subsequently suspended them because they proved to be unprofitable.

European Airways plans to re-engine its Airspeed Elizabethan fleet in two operations during the winters 1956/57 and 1957/58 if flight trials with the Napier Eland conversion are satisfactory during the next year . . . **Central African Airways** will definitely join the "Springbok" daily service partnership of British Overseas Airways and South African Airways between Johannesburg and London when it takes delivery of the first of its five Viscounts.

UAT-Aeromaritime is expected to order five or six more Nord 2501 Noratlas twin-boom transports to replace Herons in Central Africa; the aircraft will have Turbomeca auxiliary jets.

Manufacturing Briefs

Several British aircraft firms are reported to be working on nuclear-powered planes, according to the London "Financial Times": **Rolls-Royce, de Havilland, English Electric, A. V. Roe** and **Bristol** . . . **Napier** Nomad NN8 compounded diesel is rated at 4,500 shp . . . **Avro Aircraft's** first prototype batch of CF-105 delta-wing all-weather interceptors is expected by P&W J75 engines pending availability of the Orenda P.S.13 twin-spool unit . . . **Canadair's** initial order for 13 Britannia maritime reconnaissance aircraft may be increased to 37 planes shortly.

SNCASE is building two prototypes of its Durandal rocket-propelled interceptor and will begin test flights with the aircraft late this year . . . **Blume** B1-500 is the designation of personal aircraft designed in Germany by Prof. Walter Blume, formerly head of Arado . . . An advanced version of the French **SNCASO** Trident supersonic fighter, the Trident II, made its first test flight last week; the Trident I is capable of flying beyond Mach 1 in level flight and in a climb by using rocket boosters . . .

Helio's All-Metal Courier In Production After Arduous Seven-year Struggle

COURIER PRODUCTION LINE is now under way, after seven years of development by the Helio Aircraft Corporation. The "stall-proof" aircraft is being manufactured in Pittsburg, Kans. by the Mid States Manufacturing Company under special arrangements with Helio.

Helio Aircraft Corporation has set up a new production line and completed the first demonstrator delivery of its four-place "stall-proof" Courier aircraft, apparently hitting its stride after seven years of development work during which it was often plagued by financial and engineering reverses.

The aircraft, guaranteed to take off or land with full load in 75 yards in still air, is being manufactured by the Mid-States Company in Pittsburg, Kansas under special arrangements with Helio. Sales and engineering headquarters are still at Norwood, Mass., where the Helioplane was developed.

Designed by Dr. Otto C. Koppen, head of aeronautical engineering at the Massachusetts Institute of Technology, the plane is conventional-looking except for its high tail. Embodied in the wing, however, are large flaps, automatic slats and a system which gives the pilot lateral control flying even at minimum speeds of 30 mph.

• **Priced at $24,500,** the Helio Courier cruises at 157 mph and can slow down to 30 miles with full control maintained. The all-metal aircraft incorporates several safety features recommended by the Flight Safety Foundation, including a tubular steel cabin harness stressed to withstand 15 G's, and staggered front and rear doors to help prevent cabin collapse in case of accident.

William M. Joy, Detroit aviation commissioner and aircraft sales executive, was the first of Helio's distributors to take delivery on a demonstrator from the new production line. (Several of the aircraft were previously given to private owners for service test purposes only). The second plane goes to distributor Eugene Kettering of National Aero Sales Corporation in Chicago. Dr. Lynn L. Bollinger, Helio president, said that advance orders, some of which include demonstrator models for distributors in various parts of the country, will keep the production line busy until late this year. Earliest delivery dates now open are after December. Production rate will be stepped up early in 1956. • • •

CAA Fiscal Program For 1956 Limited

CAA has been able to do little more than preserve the status quo in its fiscal 1956 program for operation of the federal airways in order to comply with the Congressional order that all major facilities in operation as of June 30 be continued.

The only additional programming calls for commissioning of 22 VORs; operation of three new airport surveillance radars; assuming cost of three airport traffic control towers, and some expansion of radar services at eastern ASR locations.

Although CAA received its requested $90,105,000 for airways operations, it had not planned on continuing a large number of INSAC stations and a few other facilities. The finalized program reflected nearly two months of figure-juggling to make up the $1 million deficit caused by the Congressional order (AMERICAN AVIATION, Aug. 1, page 25).

In announcing the '56 program, CAA Administrator Fred B. Lee said it "will be reviewed later in the fiscal year to determine whether adjustments can and should be made within limitations of available funds." Speculation is that when Congress returns in January, a request may be made for approval on discontinuance of individual facilities.

CAA also will undertake a study during the year of various functions suitable for transfer of safety responsibilities to industry.

Also programmed is $600,000 for the much-needed increased personnel to handle the expanding volume of traffic. This money will be used for additional personnel in air traffic control and communications.

The new facilities to be operated during fiscal 1956 will be at the following locations:

• **Airport Surveillance Radar:** Chicago's O'Hare Field; Denver, Colo. and Burbank, Calif.

• **Airport Control Towers:** Hutchinson, Kans.; Moline, Ill.; and Casper, Wyo.

• **VOR-Omniranges:** Adamsville, Tex.; Benton Harbor, Mich.; Gainsville, Fla.; Cherry Creek, Colo.; Glenview, Ill.; Harrellsville, N. C.; Huntington, W. V.; Los Banos, Calif.; Oceanside, Calif.; Peoria, Ill.; Perry, O.; Pt. Mugu, Calif.; Pottstown, Pa.; Salem, N. J.; San Diego, Calif.; Sayre, Okla. Stillwater, N. J.; Stroudsburg, Pa.; Walla Walla, Wash.; Web, Tex.; Westminster, Md.; and White Cloud, Mich. • • •

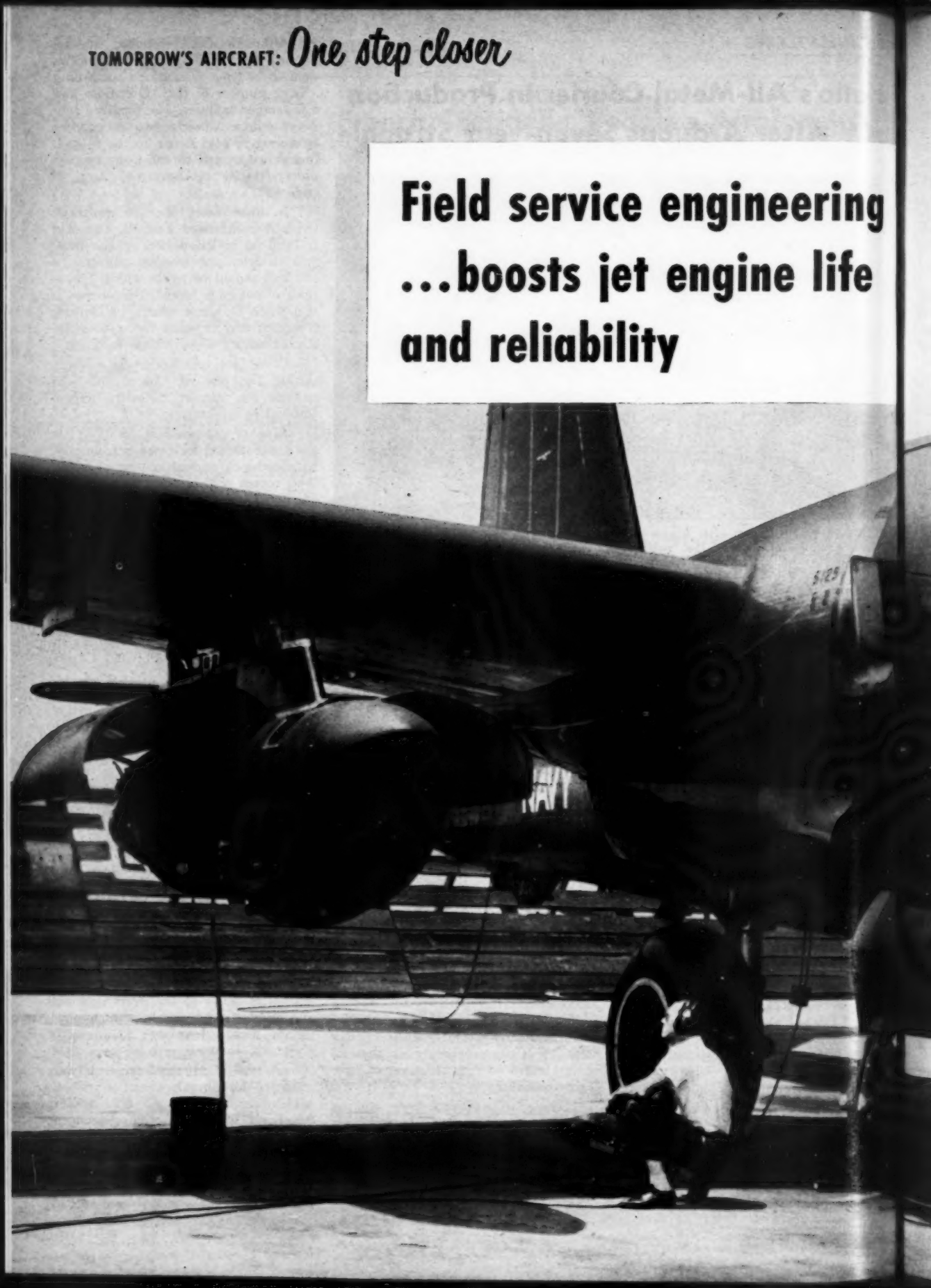
Spins or Stalls Major Factor in '54 Crashes

Spins or stalls accounted for more than half of the fatalities in non-carrier aircraft accidents in 1954, a CAA analytical study of the 3,010 accidents during that year reveals, although collisions with objects was found to be the most common type of accident.

A total of 340 fatal accidents were recorded for aircraft of 12,500 pounds and under, resulting in 608 fatalities involving 299 pilots, 296 passengers, seven co-pilots or dual students and six ground personnel and third parties. Spins or stalls caused 191 fatalities. Collisions with objects was second in number of fatalities (44 or 12.9%),

TOMORROW'S AIRCRAFT: *One step closer*

Field service engineering ...boosts jet engine life and reliability



Engineering follow-through is a specialized part of Westinghouse service designed to help you get the best possible performance out of jet engines. J34 engines have had the allowable time between overhauls increased to 1080 hours and some engines have actually run 1000 hours. Further, these engines have been certified by the CAA for commercial operation.

At the core of Westinghouse engineering follow-through are the field service engineers. These men are in constant contact with engine users everywhere and feed back data concerning the product to design engineers. They concern themselves, for example, with such problems as engine icing. They consult with pilots and tell them how to get the most out of an engine. Operating personnel benefit from consulting with these men regarding practical engine analysis to improve engine performance.

This new concept of field service engineering is an extra service from Westinghouse that is designed to get the most out of Westinghouse engines and to help you bring tomorrow's aircraft . . . One Step Closer. J-91034-B

Westinghouse field service engineers help operating personnel conduct engine check-out prior to initial flight of Lockheed's P2V-7 Neptune. Podded auxiliary turbojets permit increased speeds and heavier loads.

LOCKHEED AIRCRAFT CORPORATION PHOTO

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followed by collisions with ground or water (37 or 10.9%).

CAA has found the most common types of accidents to be (1) collisions with objects, 658 or 21.9%; (2) spins or stalls, 561 or 18.6%; and (3) ground-loops, 409 or 13.6%.

Weather continued to be the number one cause factor of accidents, followed by failure to maintain air speed. These two factors were found to be the greatest contributors to fatal accidents.

In tabulating the cause factors, CAA noted that no one cause was selected as primary, since frequently two or more cause factors were involved. All probable cause factors were tabulated as follows:

1. Most common cause factors in all accidents: *weather,* 897; *failed to maintain airspeed,* 401; *operated in unsuitable area,* 356; *lost directional control on the ground,* 315; *inadequate flight planning,* 277; *failed to avoid collisions with objects,* 273.

2. Most frequent cause factors in fatal accidents: *weather,* 182; *failed to maintain airspeed,* 129; *made flight into bad weather,* 87; and *lost control in bad weather,* 53.

Pleasure flying accounted for 1,674 of the 3,010 accidents, followed by instructional, 645. Business flying (which CAA differentiates from corporate flying) was third with 276.

Met-Co-Aire Developing $6,000 Plane

Met-Co-Aire, which has been known principally for aircraft conversions, is now engaged in developing an experimental aircraft of its own design. It is a four-place, all-metal, fixed tricycle gear aircraft, to be sold in the $6,000 bracket.

The airplane is of standard conventional configuration, powered by a Continental C-145 engine. Metal propeller, sensitive altimeter, landing lights and two-way radio are planned as standard equipment.

Design calls for a cruise speed of more than 120 mph, and a stall speed of 45 mph. The plane will have a baggage compartment for 75 pounds.

• **T. R. Hebert,** Met-Co-Aire president, said that the price of approximately $6,000 is being based on a minimum production of 500 units per year.

Met-Co-Aire's latest conversion is a tricycle gear for the Cessna 170, which has been approved by the CAA. It is now running tests on a similar gear for the Cessna 180, and expects final approval by October.

Hebert says the excellent landing and ground handling characteristics have made the Cessna 170 conversion one of the best liked tricycle gear aircraft on today's market. By removing the 170's tail wheel assembly and streamlining the main gear legs, conversion to the tricycle gear results in little or no loss in performance, Hebert declared.

• **The Met-Co-Aire** nose gear is an oil-spring oleo type strut with a 500 x 5 Firestone tire and wheel, steerable through rudder linkage. A completely new gear box section is installed midway between door posts under the main cabin floor.

Hebert says the gear has completed static load and drop tests to all limits with no failure. Little wear was indicated in service tests equivalent to 1,000 hours of normal operation.

Met-Co-Aire, which is located in Fullerton, Calif., also produces metal fuselages and wing conversions for Stinson, Cessna, Ercoupe and Piper Aircraft.

Cessna 170 equipped with Met-Co-Aire's tricycle gear.

Expert Sees Need To Plan Parking

Proper planning would solve many of the problems of providing business planes with adequate facilities close to airport terminals and buildings, according to Leigh Fisher, airport consultant of South Bend, Ind.

The primary interest of the transient aircraft user, Fisher said, is proximate parking to the terminal building for the use of government services etc.

"To bolster terminal income," Fisher said, "transient pilots should also have minimum walking distance to the terminal building, direct access to food service, auto rental agencies, pay toilets and other public conveniences and concession services available within the building."

"We have heard statements made that at larger airports provision of proximate parking area is a very difficult problem," Fisher continued. "We have found that it is solely a matter of planning, and that, if sufficient time and effort is given in the planning stage, proximate facilities and services can be made available to contribute patronage to terminal concessions and services."

• **On the other hand,** Fisher declared, "business aircraft pilots many times tend to complain that gate positions are not available to them even when such reserved space is available." Their basis of complaint seems to be that the most central gate position is not made available to them for parking.

Fisher has found that the most equitable arrangement for joint airline-transient use at airports with limited funds is to provide 30% of the terminal apron frontage for executive aircraft parking for less than 10 hours. This type of arrangement, along with either a fixed-base operator or a transient service located near the terminal, has been successfully employed at such airports as South Bend and Evansville, Ind.; Flint, Mich.; Madison, Wis.; Phoenix, Ariz.; Toledo, Ohio; San Antonio, Tex.; and Wichita, Kansas.

He feels that airports should provide near-terminal facilities for transients for "purely mercenary" reasons.

"For the last nine years," he said, "our various counts of airport traffic have shown that transient aircraft pilots and passengers range from a low of 25% of airline passenger volume to an average high of 75% to 80%. Occasionally, at smaller airports, transient pilots and passengers outnumber airline passengers. With this volume of patronage, certainly the transient aircraft user is an extremely important element in airport fiscal as well as physical planning." • • •

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$252,000,000. was total spent by North American for materiel, supplies and outside labor.

55% of the total spent went to small suppliers . . . companies with less than 500 employees.

North American Relies on Small, Aggressive Suppliers. A company like North American operates best when its many suppliers are all "on the ball." Because small businesses are constantly increasing their efficiency, North American and the aircraft industry look to them as important additional sources . . . but before North American can add a new firm to its list of sub-contractors, the company must first survey the prospective sub-contractor and determine if the firm has the necessary machinery, personnel, production know-how and financial ability to deliver the goods.

North American Experts Help Small Business Become More Efficient. Sometimes the supplier must revamp a large part of his entire production set-up. North American experts help with this work, because as the prime contractor, North American is responsible for on-time delivery and quality of the finished product. A special group from North American's Manufacturing and Quality Control Departments travels thousands of miles a month to check, coach and assist sub-contractors.

The fact that small suppliers received 55% of all North American purchases . . . proves that small business is assisting in delivery of high quality goods and services, at competitive prices . . . on time.

Yes, small business is big business with North American Aviation.

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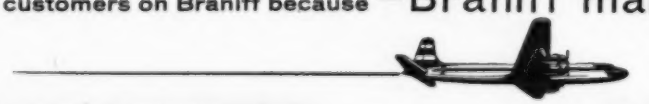
NORTH AMERICAN AVIATION, INC.

CULVER

Send your customers on Braniff because —Braniff makes the difference!



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TRANSPORT TRENDS Washington, D. C., August 29, 1955

PROSPECTS THAT HIGH INITIAL COST of jet transports will entice major U. S. and foreign airlines to pool orders with one manufacturer apparently are not dead. United Air Lines' president W. A. Patterson says his company will order 25 jets this year and expects American, TWA and Pan American to order similar quantities from the same producer, with foreign orders swelling the total to 180 aircraft.

Pooling effort, however, if it materializes, probably will be one of strategic timing by individual carriers rather than an organized procurement. Patterson points out that an order for 80 jets would represent a manufacturer's break-even point, and that airlines would place early orders with one maker to realize lower aircraft unit costs.

Although the UAL head gave no indication which jet United would buy (Boeing 707 or Douglas DC-8), he noted that Boeing's airplane has been built for military order, whereas the DC-8, still in the design stage, is more flexible as far as being suited to airline requirements.

CURRENT PRICE TAGS FOR UP AND COMING turboprop engines cover a wide range extending from below $100,000 to as high as $126,000. Allison's commercial T56 is reportedly being quoted at $87,500; higher powered British competitors are the Napier Eland NE1 4 at $98,000; Rolls Royce RB 109 at $112,000; and, Bristol BE.25 at $126,000.

LOOK FOR CAB TO GIVE NEW EXEMPTIONS to large irregular air carriers that will authorize carriage of individually-ticketed passengers on 10 flights per month between each pair of points. The decision, which is expected momentarily, also will allow unlimited charter operations by the nonskeds.

Board already has instituted procedural steps to test individual qualifications of some 60 large irregular applicants for the new authority. CAB voted 3-to-2 for what is generally considered wider operating authority for the nonscheduled lines. Chairman Rizley, Vice Chairman Adams and Member Lee formed the majority, according to best reports, with Members Gurney and Denny dissenting.

CAB DECISION IN NEW YORK-CHICAGO Case, in which Capital, Northwest and TWA reportedly will get new route awards, is now expected to be released shortly after Labor Day.

NEW YORK CITY'S WEST SIDE AIRLINES TERMINAL now is scheduled to open Sept. 15. New structure, located at 42nd Street and Tenth Ave., is 21 minutes from Newark airport via New Jersey Turnpike. The four-story terminal cost $5 million, and is expected to handle 750,000 passengers annually.

DOUGLAS AIRCRAFT CORP. NOW HAS A BACKLOG for 274 DC-6/7 series aircraft, including 17 DC-6As; 85 DC-6Bs; 31 DC-7s; 42 DC-7Bs, and 99 DC-7Cs. Company has delivered 174 DC-6s; 25 DC-6As; 186 DC-6Bs; 64 DC-7s, and 13 DC-7Bs.

A DELEGATION OF 12 CAA ENGINEERS is at Boeing-Seattle looking over the 707 jetliner preparatory to certification proceedings. Plans call for establishment of a CAA preliminary type certificate board sometime in October, according to W. H. Weeks, chief of CAA aircraft engineering.

BEECH AIRCRAFT CORP. REPORTS it has received a firm order for a Morane-Saulnier 760 twin-jet executive transport. Company reportedly is aiming at 50 orders before proceeding with production under license. First order came from J. D. Reed Co., Houston, Tex., a Beech distributor.

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Created by Lockheed especially for TWA!

Powered by newest Turbo-compound engines!

Interiors by Henry Dreyfuss, world-famous designer!

See for yourself why experienced air travelers are saying TWA's new Super-G Constellations are the finest in the skies!

As you stroll through four spacious cabins, you'll see the widest, roomiest lounge chairs in any U.S. airliner; glare-free picture windows; rich wood-paneled interiors ...much, much more. Mealtime finds you lingering over each tempting course of a complete de luxe dinner. Between meals enjoy delicious snacks or tempting canapés from TWA's galley. And all this is yours at no extra cost!

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Era of '3-Cent Airline' Awaits CAB Approval

• United and American join TWA in move to reduce rates on transcontinental flights.

By WILLIAM V. HENZEY

That 3¢ airline that's been talked about for years apparently will be here in triplicate next month if CAB approves tariffs filed recently by Trans World Airlines, United Air Lines and American Airlines.

Advanced first by TWA, the plan is to effect a $160 round-trip coach fare in the transcontinental market which boils down to $80 each way and further to 3.2¢ per passenger mile. Tickets would be good on flights conducted on Monday through Thursday each week and for trips completed within 30 days.

Tariffs of all three lines will apply for an initial six-month period expiring March 15, 1956, subject to renewal beyond that date.

• New fare represents an approximate 20% cut in the existing $99 transcontinental coach fare of the scheduled lines and amounts to slightly more than half the cost of a first-class ticket.

It will apply to travel on coach flights between New York, Philadelphia, Baltimore and Washington, on the one hand, and Los Angeles, San Francisco and Oakland, on the other. A corresponding reduction will also be offered for Boston-west coast coach traffic.

Although the new tariff erases existing price advantages of the larger nonscheduled airlines and thus will add up to stiffer price competition for those carriers, it actually was an independent TWA move which caught even its scheduled competitors by surprise.

With the scheduled lines no longer required to give advance notice of tariff filings to each other, TWA filed its tariff on August 12 to become effective on statutory 30 days' notice on September 12.

• The action was heralded by TWA by immediate full-page newspaper ads in major cities involved announcing the "lowest transcontinental air fare ever offered by a scheduled U.S. airline." Also prominent in the ads was this phrase: "No other airline—scheduled or 'non-sked'—has lower fares."

Thereafter, American and United managed to file competing tariffs; United's to become effective September 16; American's September 17. American, and possibly United, were planning to ask CAB for special permission to advance their tariffs to the proposed TWA starting date.

TRANSCONTINENTAL AIR FARES*

One-Way Fare	One-Way F. P. M.		Round-Trip Fare	Round-Trip F. P. M.
$158.85	6.4¢	First Class	$301.80	6.1¢
110.00	4.5	1951 Coach	220.00	4.5
99.00	4.0	1955 Coach	198.00	4.0
80.00#	3.2	Proposed	160.00	3.2

*Based on New York-Los Angeles fares and mileage.
$80.00 represents one-half of proposed round-trip coach "excursion" fare.

• There was much speculation over what prompted TWA's move, coming at a time when such elements of the industry were seeking proper footing for possible fare increase proposals.

Although such possibilities are not necessarily eliminated, the TWA action is viewed as a possible forerunner to a new era of lower coach fares, since it represents the first break in an otherwise solid front against discounts on coach flights.

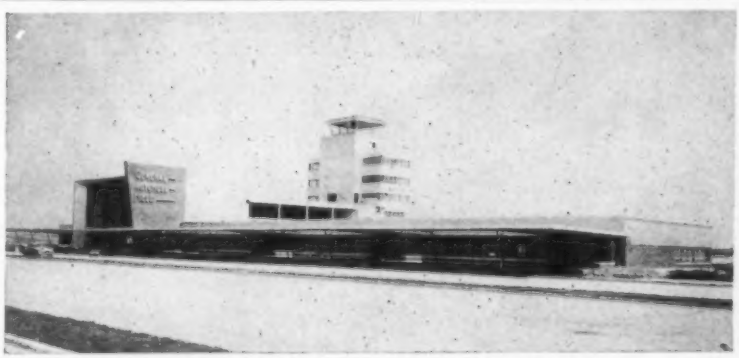
According to TWA's v.p.-traffic and sales E. O. Cocke, the new fare has a two-fold purpose; first to attract additional traffic and second to spread traffic over the full week as contrasted to heavy week-end loads and comparatively light mid-week traffic.

• Cocke explained it this way to AMERICAN AVIATION: "The new $80 fare should meet the needs of that growing travel market with more paid vacation time and a desire to visit new places at greater distances. It provides lowest cost travel within the time such travelers have to spend.

"By spreading travel through the comparatively light week-day traffic periods it provides a more efficient operation, resulting in economies which we can pass on to the public.'"

The family plan discount, which was designed specifically to bolster lagging mid-week loads, does not apply to coach flights.

• But while United and American did not file as early as TWA, both



ADMINISTRATION BUILDING for General Mitchell Field, Milwaukee, built at cost of $3,250,000, has seven-story control tower. Building was constructed primarily of lightweight Fenestra steel panels. Milwaukee County airport handles about 250 flights daily.

announced competitive tariffs with equal enthusiasm. Robert E. Johnson, v.p. and asst. to the president of United, said his company would sell tickets immediately at the new rate.

American said its travellers at the $80 fare "will have the speed and comfort of the only all DC-6 coach fleet operating in the country."

Just how this affects the non-skeds remains to be seen. The North American Airlines group, whose future hinges on an appeal to the courts of a CAB revocation decision, publishes a $160 round-trip transcontinental fare. It permits travel on round-trips up to 60 days and includes Sunday with the following four weekdays as days on which the tariff applies.

With the greater frequency of coach flights of TWA, AA and United, it is obvious that carrier will feel the effects of the new fare.

Also the new fare level of the scheduled lines will mean tougher competition for other non-skeds who are expected to be given more liberal operating authority by CAB any day now.

At CAB, where there appears to be stronger favor these days for lower fares rather than higher, early unofficial response to the TWA tariff was enthusiastic.

• **The Board must approve** the new fares but can do so merely by taking no action, permitting the tariffs to become effective on the designated dates. Doubt or disapproval would be evidenced by an order of suspension before the effective dates.

But there were no indications the Board would turn down such substantial price cuts for the public in the absence of evidence that the fares are uneconomic.

None of the three lines plans to discard present coach fares which will remain in effect for travel not fitting into the specific limitations of the new tariffs. Thus, for a traveler going only one way or not planning to complete a round-trip in 30 days, the $99 one-way fare and $198 round-trip fare will continue to apply.

All coach flights, however, will be available for travelers in either category.

Fairchild C-82 Packet Specifications

Performance

Maximum speed 230 mph
Normal Cruising speed with load 193 mph at 10,000 ft.
Maximum range 2,840 miles
Landing speed .. 105 mph

Power Plant Data

Two Pratt & Whitney R 2800-85 engines, rated at 2,100 hp.
Two Hamilton Standard hydromatic propellers.

Fuel Capacity

Gasoline ..... 2,614 U.S. gals.
Oil ..... 110 U.S. gals.
Alcohol ..... 10 U.S. gals.

Operating Load Information

Empty weight .. 30,000 lbs. (Approx.)
Useful load ... 20,000 lbs.
Payload over 1,000 mile range ... 13,500 lbs.
Payload over 2,000 mile range ... 7,500 lbs.

L. B. Smith Overhauls, Modifies C-82s For Sale to Foreign Commercial Users

The Fairchild Packet C-82 cargo-carrier is about to embark on a commercial career.

The first of a group of C-82s released for civilian use and acquired by the L. B. Smith Aircraft Corp. is getting its face lifted at that company's hangars at Miami International Airport.

The Packet was one of the first cargo-carrying aircraft of its type used by the USAF. It was designed to handle light tanks, armored vehicles, artillery and other bulky military equipment. After several years of service, it was replaced by larger ships of the same type, C-119s.

All told, 93 C-82s were released by the Air Force. L. B. Smith was one of several successful bidders for a number of the planes.

With cargo space of more than 2,300 cu. ft., and wide rear-entrance loading facilities, the Packet is capable of hauling large pieces of machinery which other cargo transports now in use find it difficult or even impossible to load.

The Packets obtained by L. B. Smith are being modified and overhauled for resale to airlines and other companies in Central and South America.

L. B. Smith engineers have found that removal of certain AF equipment increases the load-carrying potential of the Packet. They say, too, that removal of this equipment has increased its over-all efficiency.

The Packet is powered by two R 2800-85 Pratt and Whitney engines, has a useful load of approximately 23,000 pounds. With full gas load of 2,614 gallons, its maximum range is 2,500 miles.

FAIRCHILD PACKET C-82, acquired by L. B. Smith Aaircraft Corp. from U. S. Air Force, has it's AF insignia removed during overhaul. Big cargo transport is one of group slated for re-sale to foreign airlines and cargo carriers.

REAL Changes Order From DC-6Bs to DC-7C

REAL-Aerovias has altered its outstanding order for three Douglas DC-6B transports to three faster and longer range DC-7Cs with delivery slated for 1957.

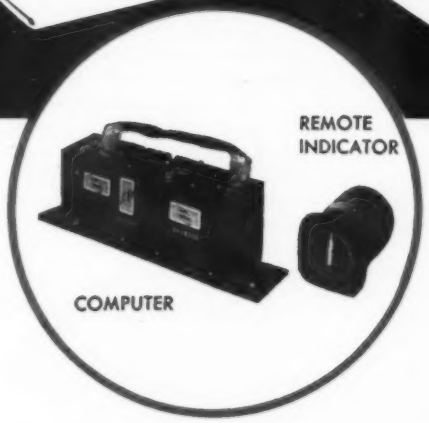
The airline has also ordered two Convair 340Bs (highly soundproofed version with new nacelle design) and is buying kits to convert its present 340s to the "B" model.

Ozark Buys More DC-3s

Ozark Air Lines has purchased three Douglas DC-3 transports from Swissair, raising its twin-engine fleet to 16 aircraft. The new aircraft are now undergoing modification at Ozark's St. Louis maintenance base and will be placed in service in September.

ANOTHER FIRST BY Greenleaf...

VITAL to Passenger and Aircraft SAFETY



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Now, for the first time in aviation history, the pilot can know, while in flight, the exact load being placed on his aircraft at strategic points due to severe weather, air shocks, etc. Strain gauges can be placed on all essential parts of the aircraft, and a direct reading obtained from the indicator in the cockpit.

The maximum deviation of the system from a straight line does not exceed 0.1% full scale. Overall accuracy is less than 1% under all conditions and repeatability is within 0.1% of full scale. Inputs of 10 to 50 m.v. display full scale deflection.

This system has been thoroughly tested and proven in service—it is designed to meet military specifications. The total volume of the entire system is less than 125 cubic inches and weight is under 10 lbs.

Use of this system will improve safety, reduce maintenance hours and provide stress or strain information prior to structural failure. Write, wire or 'phone today.

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Russian Airline Puts on New Look, Too

• Aeroflot, expanding contacts with West, now flies many others besides Communist officials; carried 15,000 foreigners in 1954.

Russia's Aeroflot, taking its cue from the smiling new look of Kremlin leaders, is fast expanding its contacts with the West.

A little-known, sometimes mysterious operation during the Stalin regime, the Soviet government's airline monopoly used to carry only a handful of foreigners. Most of these were satellite officials or Western Communists flying to Moscow to pay obeisance to the Red motherland and to make propaganda hay.

But as the Iron Curtain slowly parts, Aeroflot's clientele has begun to include a sprinkling of non-Communist businessmen, reporters, students, junketing Congressmen and even tourists. Already there is talk of establishing regular excursion flights from Scandinavia to Moscow and the Black Sea resorts.

• **In 1954, Aeroflot** carried 15,000 citizens of 60 different foreign countries, mostly to and from Moscow. The total is expected to rise sharply this year.

Waiting room in the Kazan Airport terminal.

Aeroflot's international service has increased noticeably in quantity and, to a lesser extent, in quality during the past several years (see AMERICAN AVIATION, January 21, 1952). Russia's Civil Air Fleet Administration claims to fly more scheduled plane miles, to have more route mileage and to handle more freight than any ather airline in the world in its combined foreign and domestic operations.

Even so, Aeroflot in many respects continues to lag far behind the leading carriers of Western nations.

On the plus side are the increases in flight frequency on major routes, vastly-improved terminal facilities, and the efforts to establish through ticketing procedures. At the same time there has been little improvement in equipment or speed. Stops at intermediate points are still intolerably long by Western standards.

Aeroflot says that it now has more transport planes in regularly-scheduled operation than ever before. This is borne out by the multitude of service increases shown in its latest international timetable.

Passengers arriving at Krasnoyarsk airport. Planes are IL-12s.

• **Four years ago** the Soviet carrier made two trips weekly on its Moscow-Helsinki route—then the only important air link to the West. Now the service is daily except Sundays. Eight passenger flights weekly are being offered on the Moscow-Bucharest-Sofia run, compared with two in 1951.

Similar improvements are apparent on the Moscow-Irkutsk-Ulan Bator (Outer Mongolia)-Peking, the Moscow-Budapest-Vienna, the Moscow-Vilnius-Warsaw-Berlin, and the Moscow-Prague routes. The lightly-traveled Moscow Kabul (Afghanistan) run still has two trips monthly, the same as in 1951.

Speed on important European links from Moscow to satellite capitals has shown little change in recent years. On the Moscow-Sofia route, for example, there are hour stops at Kiev and Odessa and a 45- to 50-minute stop at Bucharest. On the Moscow-Vienna run there are stops of 45 minutes at Kiev, an hour and 20 minutes at Lvov, and an hour at Budapest.

Passengers on some of the longer Aeroflot routes spend more time on the ground than in the air. Flight 119 from Moscow to Kabul (roughly comparable to the distance from Washington to Los Angeles) takes 32 hours and 25 minutes. This includes 40 minutes on the ground at Uralsk, an hour and 35 minutes at Aktyubinsk, 40 minutes at Dzhusaly, 14 hours and 40 minutes (overnight) at Tashkent, and two hours at Termez.

• **There are also** overnight stops on the Moscow-Ulan Bator-Peking flights, which take about 34 hours, and on the Moscow-Chita-Pyongyang (North Korea) run, which requires 48 hours and 25 minutes, including more than 23 hours on the ground.

Through flights are still almost nonexistent on Aeroflot's international routes. Even on the comparatively-short flights from Moscow to Helsinki, Warsaw and Berlin there is at least one intermediate stop.

Passengers flying via air France or Scandinavian Airlines to Iron Curtain countries will invariably board smaller equipment at the interchange points. If you ride a Scandinavian Airlines DC-6 or DC-6B from Stockholm to Helsinki you'll board a twin-engine IL-12 for the remainder of the trip to Leningrad or Moscow. Air France DC-4s arriving in Prague are also met by Aeroflot IL-12s.

On the other hand, travelers flying on Aeroflot IL-12s or IL-14s (which now provide two-stop express service from Moscow to Irkutsk in eastern Siberia) are likely to board smaller and older equipment if they transfer to a satellite carrier. Czechoslovakia's CSA and Poland's LOT have IL-12s for their best runs; but North Korea's SOKAO and China's SKOGA meet Aeroflot flights with LI-2s, Russian version of the DC-3.

• **Aeroflot's passenger fares,** which range from more than 25 cents a mile on short European hops (such as Leningrad-Helsinki) to 10 cents a mile on long hauls to the Far East, seem steep at first glance. Actually, air transportation is a bargain in the USSR, where a pound of sugar costs over a dollar, a man's cotton shirt is $15, and most other prices are in proportion.

The 1,000-mile flight from Moscow to Berlin via Aeroflot costs 590 rubles ($147.50). Rate from Moscow to Peking is 1,662 rubles ($415.50) and from Moscow to Pyongyang 1,760 rubles ($440). Roundtrip discount of 10 percent is offered on all routes.

Passengers who fail to arrive at the airport an hour before their plane leaves or do not have their papers in good order by flight time not only lose their reservations but are fined 25 percent of the one-way cost of their ticket. However, the penalty will in no case be more than $70 or less than $7.

Despite the continued use of twin-engine equipment on even the longest routes, Aeroflot's passengers are getting

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Vibration-Resistant Electrical Connector

The unsatisfied demand for a rugged, dependable connector capable of meeting the exacting requirements of modern aircraft led the Scintilla Division of Bendix* to develop the *first* vibration-resistant electrical connector. These connectors using the revolutionary new insert material known as Scinflex were first used on Scintilla Division's ignition equipment for piston engines.

So outstanding was the performance of this new and better connector that its acceptance and use have now become world-wide. Today the Scintilla Division is a major contributor to the electrical connector industry.

This pioneering has never stopped. Bendix was first in the field with cadmium plated connectors, which were later made a requirement of military specifications. Our latest contribution is the best engineered closed entry socket contact available anywhere—one which cannot be mechanically overstressed.

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SIDNEY, NEW YORK

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Typical interior of Russian commercial airliner.

a better break than ever before. Loading areas at most main stops have been paved, and passengers no longer need splash through mud to reach the plane or terminal.

• **There are brand-new** terminal buildings at Kazan, Sverdlovsk, Krasnoyarsk and Khabarovsk on Aeroflot's route to the Far East, as well as at Lvov and Riga in the west. Plans for 20 other new terminals were recently approved, including projects now under way at Chelyabinsk, Alma-Ata, Stalino, Minsk, Frunze, Adler, Nikolaev and Tallinn.

New airport hotels are planned at Moscow's Vnukovo field and at Aktyubinsk, Omsk and Alma-Ata.

Equipment-wise, Aeroflot may be preparing some surprises. Jet transports are now making daily mail-cargo flights from Moscow to Irkutsk, according to the official Soviet press. Regular jet passenger operations have been promised for the "not distant future."

Passport Office is Snowed Under By Record Swarm of Air Travelers

More Americans are traveling more places this year than ever before and are giving the Passport Office of the State Department plenty of problems.

Number of passports issued or renewed during the 1955 fiscal year ending June 30 totaled 499,941, setting an all-time record. International air travelers are largely responsible for that record although there still are many going by boat. To the Passport Office it doesn't matter how they travel. Their passports must be processed.

Travelers to some foreign countries, such as Canada and Cuba, do not require passports. But those going to Europe, South America, Asia, Africa, etc., do—and therein lies the big headache of the Passport Office, headed by Frances G. Knight.

• **Seeking supplemental funds** for her Office's operations for fiscal 1956, Miss Knight outlined some of the reasons for the record-breaking numbers of Americans who are going abroad and detailed the difficulties of her agency in handling the record-breaking traffic.

"The American public is on a colossal traveling spree," she said. "The war scare has subsided; there are more paid vacations; travel facilities are expanding; tourists and family rates are very attractive; credit travel is in its infancy (we don't know where that will lead us); more retirements, adequate pensions and social security have prolonged the 'travel-life-span.' By that I mean Americans begin traveling at a tender age and keep on traveling to a ripe old age."

Airline statistics confirm this analysis. In 1954, a total of 914,731 persons flew out of the U. S. Of that number, 608,487 used U. S. lines, while 306,244 used foreign lines. This year's air traffic is running far ahead of 1954.

• **Travel experts estimate** 500,000 persons will visit Europe this year. That's 10% more than in 1954. If the rate of increase is maintained, by 1960 a million Americans may be traveling to Europe by air during a 12-months' span.

According to Miss Knight, the troubles of the Passport Office are largely due to the fact that people do not plan overseas plane trips as far in advance as they should.

Twenty years ago, when a traveler faced a seven-to-ten-day crossing of the Atlantic by boat, he expected to wait two or three weeks for the processing of his transport. Today he often makes up his mind a week or so in advance of a trip, figures the crossing will take only half a day and expects to get his passport just as quickly. If so, he's in for a disappointment.

Here are some of the problems cited by Miss Knight in support of her request for supplemental funds:

• **Not only did fiscal 1955** set an all-time record for passports issued or renewed, but for the first time more passports were issued in June than in May. The peak travel season extended into July. A total of 71,626 passports was issued in June, compared with 53,432 in June 1954. The figures for May 1955 were 71,055 compared with 56,766 in May last year.

• **The greatly increased** work load was carried on by fewer personnel and on a lower budget than in 1954. Some employes have been working six days a week, 12 to 14 hours a day.

• **As of May 31,** domestic passport-searching was 7,000 cases in arrears; passport processing, 5,000 cases in arrears; unfiled applications, 225,000 in arrears; 1,074 letters were unanswered.

• **Telephone lines** of the Passport Office are so busy that during a one-week test period in May 5,000 calls never got through. At no time were there fewer than 22 calls per line waiting clearance, many of them long-distance calls.

• **The Passport Office** has 285 employes, 77 of whom are temporary workers. The House approved $600,000 in supplemental funds in its budget for 1956 and the Senate was expected to follow suit.

The Office has been processing passports at the rate of four a minute. During heavy crush periods, it has processed them as fast as 6.8 passports a minute. It's not possible for human beings to go much faster, Miss Knight believes. Electronic equipment might solve some of her agency's problems, she feels.

The Passport Office is housed in the Winder Building, erected in 1848.

Service to N. Y. Another Milestone for VARIG

• Brazilian line has grown steadily since it was launched in 1927.

By ANTHONY VANDYK

RIO DE JANEIRO—Brazil's pioneer airline VARIG has become the first Brazilian carrier to fly to New York City. Extension of the VARIG system to New York this month was another milestone in a steady expansion since the company gave Brazil its first airline service in 1927. The initial operation was between Porto Alegre, the South Brazilian city which is still the airline's headquarters, and Pelotas. Equipment used was a Dornier Wal flying-boat.

BERTA

Today VARIG (abbreviation of S. A. Empresa de Viacao Aerea Rio Grandense) has a fleet of 44 multi-engine transports headed by three L-1049G Super Constellations and five Convair 240s. Its route network totals 20,000 miles, stretching from Buenos Aires to New York. Last year VARIG carried more than 400,000 passengers, 42 million pounds of cargo and 411,000 pounds of mail.

VARIG is not only one of the largest Latin American airlines but one of the most efficient. Last year it made more money than the other seven Brazilian airlines combined. The main reason for this efficiency is that the company is 80% owned by its employees, a factor which encourages everyone on the payroll to put his utmost into his work.

• **President Ruben M. Berta,** who has been with the airline since it was founded, explains that the company operates on two principles: (1) that people only put their hearts into their work if they get something from it for themselves; and (2) that people want to have stability.

The company's Employees Foundation owns 51% of VARIG's stock. Another 30% is owned by employees privately; the state of Rio Grande do Sul holds 5% of the stock while the remaining 14% is in the hands of private holders. No dividends are paid—profits are ploughed back into the company to provide better conditions for employees, expand facilities and acquire additional equipment.

Employees are permitted to become members of the Foundation three years after they join the company. Membership brings substantial benefits including: (1) pension and life insurance; (2) free medical service and supplies; (3) interest-free loans chiefly for the acquisition of housing; (4) access to vacation resorts operated by VARIG; and (5) access to commissaries operated by VARIG.

The commissaries are located at each of the airline's major bases and provide a wide range of commodities ranging from foodstuffs to furniture and clothing at up to 30% less than normal retail prices. These discounts result from bulk buying and selling at cost. Employees turn in their list of requirements to the commissary and have their order delivered free. The cost of the items purchased is deducted from their paycheck.

• **The Foundation is controlled** by a 300-man College comprising the senior members of the airline. Seniority dictates the number of votes that each College member holds. It is the College that elects the president of the Foundation, who is automatically president of VARIG.

The president can dismiss anybody from the company but he cannot remove an employee from the Foundation although he can recommend that the College does so. Commenting on the unusual organizational structure of his company Berta says: "I can't forecast whether it would work for any other airline but for us it has been an outstanding success."

Rarely has that hackneyed expression "one happy family" been more applicable than it is in the case of VARIG's 3,400 employees. Their average age is 28 and most of them speak English. All employees receive their training at VARIG's big base at Salgado Filho airport, Porto Alegre.

Latest medical and psychological methods are used in the selection of employees, who are recruited from all over Brazil. The training school handles about 150 pupils each year and has a permanent staff of 28 instructors. For pilot training VARIG has a fleet of 17 single-engine aircraft.

The VARIG base at Porto Alegre has several features which are rarely found at airline headquarters. It has, for example, its own laundry and dry-cleaning facility. Radio equipment is manufactured by VARIG for the 57 radio stations and 42 radio beacons that the airline owns and operates. To keep these facilities on the air VARIG has had to set up 88 emergency power stations.

• **Other "extra-curricula" investments** by the airline involve the installation of runway lights at 17 airports, construction of a concrete runway at its Salgado Filho, Porto Alegre, base and certain airport buildings. In some cases the airline has used its own money to build facilities planned by the government but stalled for lack of funds; VARIG hopes eventually to be reimbursed for these outlays.

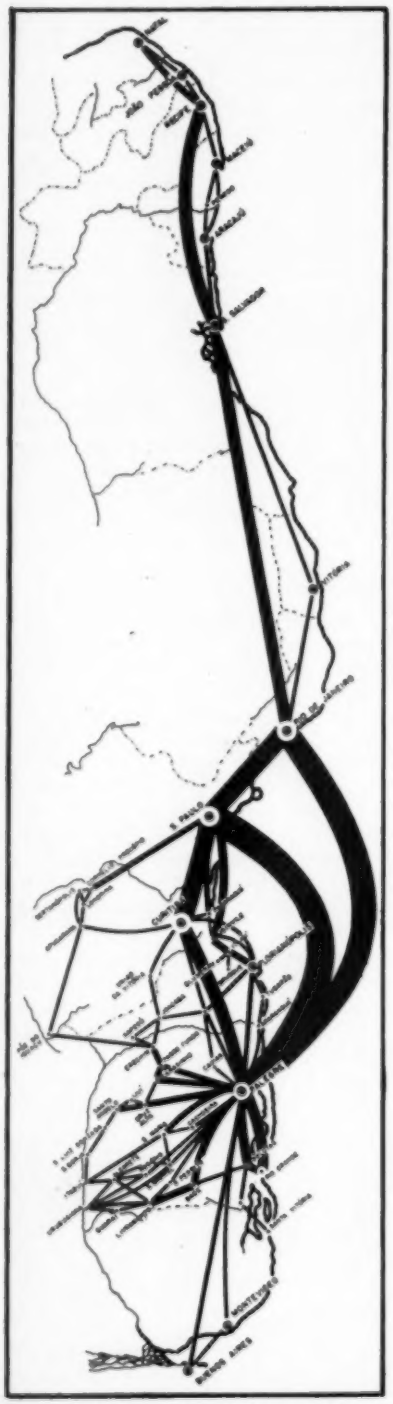
VARIG's biggest investment to date is the purchase of the three L-1049G Super Constellations used on the New York service. The state of Rio Grande do Sul is guaranteeing the $3,110,000 loan made to the airline by the Export-Import Bank to assist in the financing of the $7 million purchase of aircraft and spare parts from Lockheed Aircraft Corp. The Super Connie order represents a major stage in VARIG's development since the aircraft are the first four-engine type ever operated by the airline.

Nonetheless, airline officials expect no particular difficulty in maintaining the L-1049Gs at the 30-acre base at Porto Alegre. The company performs all overhaul work on its twin-engine fleet of 22 DC-3s (11 with 28 seats, 9 with 21 seats and two all-

WITH THREE L-1049G SUPER CONSTELLATIONS, VARIG has the most modern equipment of any Latin American airline. The rest of the company's 44-plane fleet are twin-engined.

seats, 4 with 38 seats and 6 all-cargo) and five Convair 240.

Overhaul life of the P&W R-1830s used by VARIG is 1,200 hours while the R-2800-75Bs are at 1000 hours and the R-2800-CB17s at 1,300 hours. The engine shop overhauls about 12 engines each month and its facilities are being increased to double this quantity.



VARIG'S SOUTH AMERICAN SYSTEM is dense. Busiest routes are those linking the airline's Porto Alegre base with Sao Paulo and Rio de Janeiro. Thinnest line on map indicates weekly round trip. Map does not show the new route from Rio de Janeiro to Belem, Ciudad Trujillo and New York.

• **One of the unusual** features of VARIG is that it uses aircraft with jet power—the eight passenger-carrying C-46s each have two Turbomeca Palas auxiliary jets to improve takeoff. These engines are overhauled by the airline and are currently at a 250-hour overhaul life. VARIG officials are pleased with the engines and the performance boost that they give to the C-46.

In addition to overhauling its own transports and trainers VARIG has a contract to do major overhauls on all of the Brazilian Air Force's C-46s. Another important government contract is for the repair and overhaul of lightplanes used by Brazilian flying clubs. To date the airline has rebuilt about 60 of these aircraft and the work is continuing at the rate of about ten a month.

VARIG has a small facility at its base for overhauling and rebuilding motor vehicles since it operates a fleet of 150 trucks for door-to-door pick-up and delivery of air cargo shipments. Like all Brazilian airlines, VARIG carries tremendous quantities of all kinds of air freight. Last fall the company started a night mail and cargo service between Porto Alegre, Sao Paulo and Rio de Janeiro.

• **While VARIG hopes** to carry heavy loads of cargo on its new route to New York, the major revenue from this operation will be from the carriage of passengers. Airline officials do not underestimate the building up passenger traffic on this service. Special attention has been given to passenger service and KLM Royal Dutch Airlines has provided some assistance in training cabin personnel.

The galley used on the VARIG Super Connies is the same as that used on KLM's aircraft. On each flight six cabin attendants are carried and each item of food is prepared by a chef; for example, bulk packs of butter are carried and these are sliced into pats before the meal is served. Certain courses are taken to passengers on a buffet on wheels that enables everyone to choose which item he wants and how much he wants of it. VARIG's Super Constellations carry first-class passengers in the center and rear compartments and tourist-class passengers in the forward cabin.

VARIG's Super Constellations provide direct service between New York, Ciudad Trujillo (Dominican Republic), Belem, Rio de Janeiro, Sao Paulo, Porto Alegre, Montevideo and Buenos Aires. Initially a weekly frequency is being operated but this will be doubled in the late fall. By the beginning of 1956 a thrice-weekly service should be in operation. If VARIG's service to New York proves as successful as the airline's operations in South America, the airline has a bright future in the inter-American market. • • •

Service, Efficiency Keys to Success For Locals, Says Piedmont's President

Piedmont Airlines, the nation's largest local service carrier, inaugurated new Washington, D. C. service on August 17—with three round-trip flights daily between Washington and Charlottesville, Lynchburg and Roanoke, Va.; Bluefield, W. Va.; Tri-Cities (Bristol, Va.-Tenn., Johnson City and Kingsport, Tenn.), and Knoxville, Tenn.

The carrier thus became the tenth scheduled airline operating into and out of the Washington terminal.

Moved, perhaps, by this latest evidence of his company's expansion, T. H. Davis, Piedmont president, reflected on the long-range situation of his and other local service airlines.

Capsulized, these were among his observations.

• The CAB appears to be following a wise course in awarding good routes to local service carriers in an effort to eliminate their subsidy requirements.

• Consolidations and mergers of local airlines should be considered in cases where a carrier shows no significant progress toward self-sufficiency. There is no excuse for maintaining expensive, publicly-subsidized carriers if there is no likelihood they will become subsidy-free in the forseeable future.

• The only way for a local carrier to grow is to provide service *when* the passenger—and the potential flying public—wants it. It is better to use two smaller aircraft, DC-3s for instance, than one larger plane.

• Local service carrier growth now linked to early availability of new, faster, economical aircraft—specifically designed to fit local airlines' needs. The big problem is to persuade American manufacturers to start production.

• Convairs and Martin 202s—as substitutes for DC-3s—are not very suitable for local service operations. Their added speed is outweighed by

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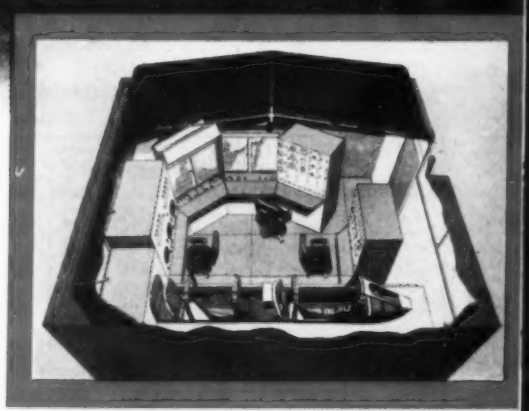
In this way, Link helps the ADC pilot and radarmen develop a working relationship with each other and with the mighty instrument of defense they will operate. Link helps them to work more efficiently, more effectively, in guarding America.



Fitting the sky between four walls, this Link F-89D Jet Flight Simulator, developed under Link basic patents, duplicates precisely the flight and radar characteristics of the Scorpion.

LINK INVITES APPLICATIONS FROM QUALIFIED ENGINEERS AND DRAFTSMEN.

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T. H. DAVIS

higher unit operating costs and greater time required at ramps.

• Unless new aircraft can reduce seat-per-mile costs—the most significant operating statistics—local carriers are better advised to stick with DC-3s.

• Local carriers, operating over short, multi-stop routes, can appreciably reduce their schedule time by lowering to three or four minutes the maximum time spent at ramps. Stair doors and waist-high baggage compartments on Piedmont's DC-3 fleet permit this fast ramp time, and allow its planes relatively more time in the air.

• The use of male pursers instead of female stewardesses has been important in reducing time and expense at terminals. Pursers arrange baggage of departing passengers in advance of landing, thereby expediting ramp work.

• Of all the planes with a potential for local carrier operations, the Fokker F-27 is closest to ideal—meeting practically every specification established by the committee of the Conference of Local Service Airlines.

• The fact that the F-27 is pressurized is especially important, for the public is rapidly being sold on pressurization. If local airlines can't provide it, they will begin feeling the effects on their traffic within three years.

• There should be no great difficulty in disposing of DC-3, Convair and Martin 202 equipment because of the growing demand for larger executive aircraft. Prices for this equipment should hold up pretty well, too.

• Nor should there be any trouble in financing new aircraft, provided they bring lower seat-per-mile costs.

CAB Stays Decision Grounding Nonsked

Civil Aeronautics Board has stayed its decision to revoke North American Airlines' letters of registration on September 1, until 30 days after decision by the U.S. Court of Appeals on a contemplated North American appeal.

At the same time, so-called "cease and desist" provisions of CAB's decision, which would have required North American to cut back its operation immediately to effect compliance with CAB regulations, were stayed through August 30, by the Board.

The agency refused further stay of the cease and desist rulings to avoid condonation of continued "illegal" operations during Court trial of the case. However, North American may seek a Court stay of those provisions at the appropriate time.

In granting the revocation stay, CAB said it is "unconvinced by North American's substantive arguments" but "recognizes respondents' right and announced intention to seek judicial review of the Board's decision. In the particular circumstances of this case, the Board is of the opinion that it would not be contrary to the public interest to postpone the effectiveness of the July 1 (revocation) order.

SUMMARY OF U. S. DOMESTIC AIRLINE TRAFFIC FOR SECOND QUARTER 1955 AND 1954

Compiled by American Aviation Publications from Official C.A.B. Data.

AIRLINES	REVENUE PASSENGERS (IN THOUSANDS) 1955	1954	% Change	REVENUE PASSENGER MILES (IN MILLIONS) 1955	1954	% Change	AVAILABLE SEAT MILES (IN MILLIONS) 1955	1954	% Change	PASSENGER LOAD FACTOR 1955	1954	FREIGHT TON MILES (IN THOUSANDS) 1955	1954	% Change	TOTAL TON-MILES REV. TRAFFIC (IN MILLIONS) 1955	1954	% Change	AVAILABLE TON-MILES FLOWN (IN MILLIONS) 1955	1954	% Change	% AVAILABLE TON-MILES USED 1955	1954
American	1,928	1,702	13.3	1,113	980	13.6	1,596	1,381	14.1	69.74	70.96	15,997	13,955	14.6	130.0	114.8	13.2	212.9	185.5	14.8	61.06	61.89
Braniff	426	369	15.4	158	134	17.9	249	214	16.4	63.45	62.62	954	802	19.0	16.9	14.3	18.2	29.6	25.3	17.0	57.09	56.52
Capital	686	639	7.4	215	200	7.5	353	331	6.6	60.91	60.42	950	1,147	-17.2	23.0	21.7	6.0	50.7	48.5	4.5	45.36	44.74
Colonial	113	104	8.7	29	26	11.5	50	43	16.3	58.00	60.46	79	70	12.9	2.8	2.6	7.7	5.2	4.8	8.3	53.85	54.17
Continental	n.a.	142	. .	59	52	13.5	107	94	13.8	55.14	55.32	360	276	30.4	6.3	5.5	14.5	13.0	11.9	9.2	48.46	46.22
Delta-C&S	553	454	21.8	251	198	26.8	364	323	12.7	68.96	61.30	1,679	1,418	18.4	27.2	21.8	24.8	43.3	38.7	11.9	62.82	56.33
Eastern	1,702	1,418	20.0	846	715	18.3	1,303	1,221	6.7	64.93	58.55	3,341	2,264	47.6	93.6	78.1	19.8	174.6	158.7	10.0	53.61	49.21
National	303	238	27.3	212	163	30.1	311	279	11.5	68.17	58.42	1,032	1,159	-11.0	23.4	18.6	25.8	35.1	31.8	10.4	66.67	58.49
Northeast	139	123	13.0	28	25	12.0	48	44	9.1	58.33	56.81	106	85	24.7	2.7	2.4	12.5	4.8	4.6	4.3	56.25	52.17
Northwest	337	295	14.2	219	201	9.0	376	331	13.6	58.24	60.72	1,568	970	61.6	24.9	21.8	14.2	47.5	40.3	17.9	52.42	54.09
TWA	998	899	11.0	741	683	8.5	1,090	986	10.5	67.98	69.26	5,845	4,777	22.4	81.9	75.5	8.5	131.8	119.7	10.1	62.14	63.07
United	1,443	1,210	19.3	988	784	26.0	1,427	1,174	21.6	69.24	66.78	10,418	8,032	29.7	114.2	90.5	26.2	190.7	158.7	20.2	59.88	57.03
Western	276	198	39.4	128	96	33.3	215	174	23.6	59.53	55.17	659	504	30.8	13.7	10.2	34.3	24.8	19.1	29.8	55.24	53.40
TOTALS	8,904	7,791	16.2	4,987	4,257	17.1	7,489	6,595	13.6	66.59	64.55	42,988	35,459	21.2	560.6	477.8	17.3	964.0	847.6	13.7	58.15	56.37

1/ Includes Pioneer Air Lines
2/ 8944 - 7791.142 (Continental's 1954 revenue passengers subtracted from 1954 total to yield comparable data.)
n.a. Not available.

SUMMARY OF U. S. INTERNATIONAL AIRLINE TRAFFIC FOR SECOND QUARTER 1955 AND 1954

Compiled by American Aviation Publications from Official C.A.B. Data.

AIRLINES	REVENUE PASSENGERS (IN THOUSANDS) 1955	1954	% Change	REVENUE PASSENGER MILES (In MILLIONS) 1955	1954	% Change	AVAILABLE SEAT MILES (IN MILLIONS) 1955	1954	% Change	PASSENGER LOAD FACTOR 1955	1954	FREIGHT TON MILES (IN THOUSANDS) 1955	1954	% Change	TOTAL TON-MILES REV. TRAFFIC (IN MILLIONS) 1955	1954	% Change	AVAILABLE TON-MILES FLOWN (IN MILLIONS) 1955	1954	% Change	% AVAILABLE TON-MILES USED 1955	1954
American	30.9	26.7	15.7	20.3	17.1	18.7	32.0	35.3	-9.4	63.44	48.44	645	597	8.0	2.8	2.4	16.7	4.3	4.8	-10.4	65.12	50.00
Braniff	8.9	8.1	9.9	19.8	19.6	1.0	42.9	42.7	0.5	46.15	45.90	263	245	7.4	2.6	2.6	0	5.5	5.6	-2.8	47.27	46.43
Colonial	12.7	14.5	-12.4	9.8	11.3	-13.3	13.4	14.5	-7.6	73.13	77.93	14	19	-26.3	1.1	1.3	-15.4	1.5	2.1	-28.6	73.33	61.90
Delta-C&S	12.4	10.8	14.8	14.0	12.6	11.1	29.7	28.1	5.7	47.14	44.84	179	298	-39.9	1.6	1.6	0	4.1	3.9	5.1	39.02	41.03
Eastern	46.4	37.3	24.4	64.8	51.3	26.3	97.6	101.7	-4.0	66.39	50.44	235	214	9.8	7.3	5.9	23.7	12.1	12.6	-4.0	60.33	46.83
National	23.5	22.0	6.8	12.7	11.7	8.6	26.4	26.1	1.2	48.11	44.83	132	114	15.8	1.5	1.3	15.4	3.3	3.2	3.1	45.45	40.63
Northwest	25.2	22.9	10.0	49.9	41.4	20.5	92.8	74.3	24.9	53.77	55.72	1792	1507	18.9	9.6	6.7	43.3	15.1	11.1	36.0	63.58	60.36
Panagra	33.8	31.8	6.3	39.8	34.7	14.7	67.3	64.7	4.0	59.14	53.63	635	647	-1.9	5.1	4.6	10.9	9.0	8.9	1.1	56.67	51.69
Pan American																						
Latin Amer	239.2	208.8	16.8	230.9	200.6	15.1	363.6	341.4	6.5	63.50	58.76	7456	6962	7.1	30.9	27.3	13.2	51.0	44.9	13.6	60.59	60.80
Atlantic	228.3	191.7	19.1	287.6	222.6	29.2	421.2	343.3	22.7	68.28	64.84	4651	3415	36.2	37.2	29.0	28.3	55.5	45.1	23.1	67.03	64.30
Pacific	57.4	38.2	50.3	179.1	137.9	29.9	253.4	216.8	16.9	70.68	63.61	3191	2557	24.8	25.6	19.8	29.3	37.5	32.3	16.1	68.27	61.30
Alaska	20.7	20.5	1.0	25.0	22.3	12.1	42.1	41.4	1.7	59.38	53.86	1164	1253	-7.1	3.8	3.7	2.7	7.6	7.1	7.0	50.00	52.11
TWA	69.1	61.0	13.3	179.5	161.6	11.1	252.7	241.6	4.6	71.03	66.89	2009	2107	-4.7	23.1	21.0	10.0	32.0	29.0	10.3	72.19	72.41
United	20.7	17.5	18.3	51.4	43.6	18.1	67.2	57.7	16.5	76.64	75.56	214	205	4.4	5.8	4.9	18.4	8.3	6.2	33.9	69.88	79.03
TOTALS	829.2	707.8	17.2	1184.7	988.3	19.9	1802.3	1629.6	10.6	65.73	60.65	22580	20140	12.1	158.0	132.1	19.6	246.8	216.8	13.8	64.02	60.93

John Brancker, International Air Transport Association's traffic director, had noted that ticket counter agents often have trouble during rush hours with passengers squawking about excess baggage charges.

Airline agents, he reasoned, might be able to shut off argument if they could show something to protesting passengers "which would be conclusive proof that airlines . . . are powerless to make any concessions and are, indeed, subject to fine if they do anything more than weigh and collect." So IATA has given member airlines a very formal, official-looking document, explaining excess baggage rules, that agents can present to complainants. Sounds like good psychology. IATA's public relations office, we understand, gets credit for a big assist on the idea.

* *

There's a novel "set of instructions" circulating among airline sales people these days. We don't know the origin; first we heard of it was when Ken Kiefer, North Central Airlines' Milwaukee manager, posted it on his bulletin board.

We quote Kiefer: "It has come to the attention of the management that employes have been dying on the job and refusing or neglecting to keel over. This practice must stop . . . In the future, if a senior agent notices that an employe has made no movement for a period of two hours it will be his duty to investigate; because it will be almost impossible to distinguish between death and the natural movements of some employes, senior agents are cautioned to make a careful investigation. Holding a paycheck in front of the suspected employe is generally considered an authentic test, but there have been cases reported where the natural instinct has been so deeply imbedded that the hand of the employe has made a spasmodic clutch even after rigor mortis has set in. Your cooperation will be appreciated."

* *

Eastman Ironmonger handles United Air Lines' tour and foreign sales in New York. His friends call him "East." A new telephone sales agent recently received a call from someone asking, "How can I reach East Ironmonger?"

The agent's frantic search through guides and atlases was finally interrupted by a supervisor who clarified the situation.

TWA, EAL Interlock Teletype Circuits

For the first time in airline history, two carriers have interlocked their systemwide teletype communications circuits to promote speedier interline reservations service for the traveling public.

TWA and Eastern Air Lines have interlocked their circuit so that any TWA station in the U.S. can transmit a message directly to any EAL office, or vice versa. The two systems are automatically bridged at New York. No manual handling—retyping, directing or reperforating of teletype tapes—is necessary.

The move may be a forerunner of a much more extensive interlocking of systems throughout the industry, where such systems are compatible. EAL uses American Telephone & Telegraph's 81-C-1, while TWA's is 81-D-1. The versions are compatible—they will operate when interlocked by a connecting circuit and a few pieces of adapter equipment.

In a typical month EAL and TWA will exchange more than 6,000 interline passengers, with an average of 2.3 interline messages per passenger. Some of this communications traffic will still be handled by phone between local offices, but a large portion will be diverted to the teletype. TWA stated that by interlocking one reservations agent at each airline "may be freed on each transaction to permit him to perform his primary job as telephone salesman of airline seats to the public.

Only reservations messages will be transmitted over the circuits at first, but it is expected that other types of administrative and operational communications traffic will be carried after the airlines gain experience in the joint venture.

Sales, Traffic, Promotion

National Airlines will install an automatic reservations system in its New York ticket offices. Teleregister Corp., which made **American Airlines'** Reservisor and the equipment now used by **United Air Lines**, will manufacture and install the system. It will be in service in time to help handle peak winter traffic. Agents at nine **NAL** offices in the New York area in addition to the central reservations staff will have access to the system through use of keysets at ticket counters. . .

In a tie-in deal with Stuckey's, Georgia candy maker, **Delta-C&S Air Lines** is giving each passenger on its DC-7 flights a small box of pecan candy. In September, Stuckey's will put out three brands of candies named after Delta-C&S' Golden Crown flights. . .

An **Eastern Air Lines** Super Constellation plastic model is being offered as a premium (a box-top and $1) on 3,000,000 packages of Mar-Gold oleomargarine to be sold in the Atlanta area. Tie-in promotion was arranged by Danny Sinkler, **EAL's** Atlanta traffic and sales manager . . . An **EAL** informal poll of over 1,300 travel agents in cities along its system showed that pleasure travel, domestic and international, was expected to be up 17% to 18% this summer. Sales of **EAL's** Happy Holidays package tours have been up 40% . .

Opening of **West Side Airlines** Terminal in New York was postponed from Aug. 24 to Sept. 15 . . . **Swissair** starts using radio this fall as part of its overall U.S. advertising campaign. It will sponsor two weekly 20-minute programs over New York stations **WQXR** and **WWRL**. . .

Pan American World Airways is giving away pocket-sized guidebooks on Argentina, Bolivia, Brazil, Colombia, Ecuador, Mexico, Guatemala, Panama and Peru. They're reprints from **PAA's** world guide, "New Horizons" . . . **Capital Airlines**, with an eye on Viscount promotion, points out that signs are being affixed to insurance machines at airports and placed on booth counters stating: "Insurance covers all aircraft operated by scheduled airlines, including helicopters, jet aircraft and turboprop aircraft" . . .

American Airlines' special airfreight service which allows customers to make advance reservations on certain DC-7 flights was extended to four more cities on Aug. 15—Boston, Detroit, Cincinnati and Chicago. Service had formerly been available only in New York, Washington and Los Angeles . . . **AA's** airfreight—customer service telephone center at Los Angeles has transferred from downtown to the freight terminal at the airport, thus concentrating all freight services to the customer in one location . . .

. . . **AA** has installed a novel "beep" system in its Buffalo telephone reservations office to make the public more aware of service to Niagara Falls. When AA's switchboard operator receives a call from the Niagara Falls area, she gives the reservations agent a beep signal. Agent then tells client about service at Niagara Falls airport rather than Buffalo. Formerly, the agent, not knowing where the call originated, quoted Buffalo connections unless client specifically asked for Niagara Falls. **AA** believed business at Niagara suffered as a result. . . .

Airfreight office opened by **United Air Lines** at San Francisco International Airport is designed as a prototype for future freight offices to be built at key cities on the system. Office has 9,000 sq. ft. of floor space; a live poultry room has controlled temperatures and there's a special section to accommodate traveling dogs. . .

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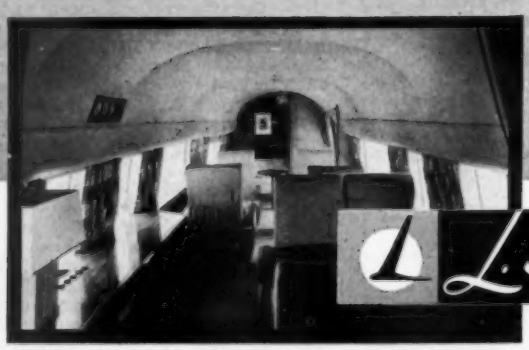

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CAB NEWS

Recent Decisions

Domestic Trunklines' new multi-element rate structure, scheduled to become effective September 1, has been delayed by CAB until October 1, at the request of the Post Office.

Seaboard & Western Airlines has been granted 90-day exemption to continue existing operations until its new transatlantic all-cargo certificate can be implemented.

Pan American World Airways authorized to operate nonstop service between New York and Ciudad Trujillo, D. R. on a permanent basis.

Tuya Cuban Express Corp., a Cuban air freight forwarder, has been granted the first foreign air carrier permit for "indirect" operations from New York and Miami to Havana.

Calendar

Sept. 7—Oral argument, Trans-Texas Permanent Certification Case. Wash., D. C. Dockets 6485 et al.

Sept. 7—Conference, Florida-Texas Service Case. Wash., D. C. Docket 5701 et al.

Sept. 8—Conference, Intra-Alaska Route Investigation. Wash., D. C. Docket 6093.

Sept. 14—Argument, Denver Service Case. Wash., D. C. Docket 1841 et al.

Sept. 19—Hearing, Texas-California Interchange Case. Wash., D. C. Docket 6597 et al.

Sept. 19—Hearing, Delta-C&S International Mail Rate Case. Wash., D. C. Docket 2564.

Sept. 27—Hearing, Erie-Detroit Service Case. Erie, Pa. Docket 6927 et al.

Oct. 3—Hearing, New York-Nassau Service Case. Wash., D. C. Docket 7002 et al.

Pending Cases

CAB is still pushing to get out decisions late this month or early next in the **New York-Chicago** and **Large Irregular Air Carrier** cases. Board has reached basic decisions in both cases and opinions are being prepared.

Also, with the early scheduling of oral argument in the **Denver Service Case** (Sept. 14), a decision by October or November is now likely.

CAB Applications

Piedmont Aviation and **Allegheny Airlines** filed applications for permanent renewal of their local service certificates in line with Congressional action assuring permanency for local lines.

The Flying Tiger Line asked CAB approval of a proposed New York to Geneva charter flight carrying 60 members of Moral ReArmament.

Eastern Air Lines applied for amendment of its Routes 5 and 10 certificates to include Panama City, Fla. as a new intermediate.

EN ROUTE . . .

WAYNE W. PARRISH

Germans Have Done Well with Tempelhof

When I went to Germany in June with Lufthansa I begged off the organized press tour arranged for the visiting press, since it was mainly scenery anyway, and set my primary objective as Berlin. I'd been there a half-dozen times after the war but not for the past five or six years.

Only three airlines have been permitted to fly to the former German capital which, as you know, has been split up into four sectors (U.S., British, French and Russian) and is isolated a hundred miles or so within the Russian zone of Germany. The three lines are Pan American, British European, and Air France.

Air traffic is heavy, but the internal German fares are so low that nobody's making any money at it. BEA has turned over its Berlin route to a British independent, Air Charters, Ltd., and it was on one of the latter's DC-4's that I flew from Hamburg and back. Under government regulations, every unsold seat out of Berlin must be turned over to German refugees escaping from East Germany through the Berlin gateway to the western zones. So it's rare that you'll find an empty seat on the Berlin shuttle.

BEA was, as always, very helpful. P. F. Lewindon, the manager for Germany; Derek Carr, sales supt. for Germany, and Peter Stimpson, station supt. at Hamburg, extended numerous courtesies in Hamburg and Carr came into Berlin for my second day there.

Flying into Berlin has been an adventure. At least it seems so to me. It's only an hour and ten minutes from Hamburg, but a few minutes after takeoff you cross onto Russian-held territory and remain over it until you hit Berlin proper. The flight is actually very routine, but on the other hand if the plane is even slightly off course you'll have some Russian MiG's buzzing around as a warning. And then there is always the intriguing possibility of an emergency landing in the Russian zone, although I don't believe a single one has ever taken place despite the many thousands of flights under less-than-perfect conditions.

No-Man's-Land

From the air I spotted the 20-foot-wide no-man's-land of freshly-raked earth which comprises the boundary between East and West Germany. Then Capt. McKenzie invited me to the DC-4 cockpit for the remainder of the flight. Naturally I kept looking for MiG's, but none showed up. Incidents on the air corridor have been infrequent for some time. It did seem to me, and a German fellow-passenger confirmed it, that the fields weren't as green as those of West Germany. All I heard on the German trip was about the deterioration of agriculture and industry in East Germany. But from the air it was difficult for a casual visitor like myself to spot any differences except for the notable absence of traffic on the roads below.

Berlin showed up in the distance a long way out. It's spread out over a wide area and I learned for the first time that the city area is second only to Los Angeles in size. The population, however, has dropped a million since before the war and it now has about three million. We made a wide circle over the city and came into Tempelhof from the east, following the usual (and virtually the only possible) traffic pattern because the airport is right in the city and definitely limited for runway space. To the southeast as we circled I saw the big Russian airfield just outside the city.

We taxied up under the huge overhanging roof of the vast terminal building, unique among all airports of the world. Being able to load and unload and carry on ramp service under a roof is a luxury which only Hitler's Germany could afford. So far the traffic isn't so heavy that all airplanes up to and including DC-4's can't be handled underneath, but such overhangs would be prohibitive in cost at the major airports in the U.S.

The Germans let you know soon enough that Tempelhof is again their civil airport. And they've done a good job fixing it up with waiting rooms, restaurant and shops. It's a very busy place at certain hours of the day. And to anyone in aviation Tempelhof as a whole is worth seeing. No grander airport buildings were ever designed anywhere. The main terminal hall is still not being used since it was pretty heavily damaged in the war. The U.S. Air Force hangar and ramp area is deteriorating badly. Wonder why it isn't being maintained?

Welcoming Committee

I had a welcoming committee to meet me. There was D.S.T. "Bill" Bailey, BEA's Berlin manager; Dick Pears, ex-Braniff who is running the airport; Rolf Julich, a native Berliner who works for BEA; and Lt. Col. John H. Galloway, public information officer for the Berlin Command, U. S. Army. Seems that Al Bentz, managing editor of this magazine, and Galloway, are old buddies and Al had sent word ahead of my arrival. Good thing, too, for several reasons.

Biggest reason was that Berlin was jammed to the rafters with visitors in June, first for a medical convention and then for a film festival. Not a hotel room was to be had anywhere. As would befit an Army PIO, Col. Galloway proved well up to the occasion. He fixed me up in Harnoch House, a VIP hostelry run by the Army, out in the American sector. So for 75c a night, I had fine lodgings which reminded me of the days when I had visited Berlin earlier, all of the visits having been sponsored by the military.

Second biggest reason is that the only sure way of visiting the Russian sector of Berlin is in a U.S. Army car. And Col. Galloway took me on the biggest tour I've had of the sector, but I'll tell about that next issue. Of course I'd have gone over there anyway, but you never know what might happen. Lots of westerners take the subway—it's as simple as that—or go over in a private car. I've wandered around over there quite a number of times, but still and all, if you want to avoid trouble, stick with the U.S. Army.

The first night I had dinner with Bailey and Julich. We started out with a very AAA-1 dinner with excellent wine at Maison de France on Kurfurstendam, the Fifth Avenue of Berlin, which is located in the British sector. The French have gone all-out to put a first-class display case in the heart of Berlin.

After that we rode up the avenue and saw the bright lights—at night Kurfurstendam is gay with lots of cafes and lighted store windows—and then went to a big dance hall called Resi, a very famous spot. This is the place that originated the dancing waters, the fountains that play with music and lights, an entrancing sight if you haven't seen them abroad or in the U.S. where they are now popular. They were new to me. There's a big dance orchestra and 250 booths. Each booth has a telephone and a lighted number over it, as in Hamburg, but Resi's has something else. It has a pneumatic tube system by which you can send written messages to any other booth in the place.

Woman Censor

Quite intricate and intriguing, the pneumatic tubes. Just spot a dame way over at Booth No. 45 and write a note to her. But then I found out that a woman at the control center intercepts all the messages and censors them. So you'd better use the telephone. Never mind the language difficulties—you won't have any trouble. By all means make a visit to Resi's when you go to Berlin. It's a spot unlike anything else in Europe.

Back in Hamburg I discovered that the airport has a small hotel on the upper floors, very fine for a clean-up before a long flight or an overnight sleep . . . Lufthansa, the German airline, has one stewardess by name of Margot Rohde, who is an absolutely bewitching beauty; she's a native of Berlin and won't have any trouble going places and doing things.

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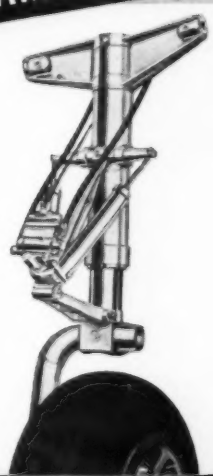

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